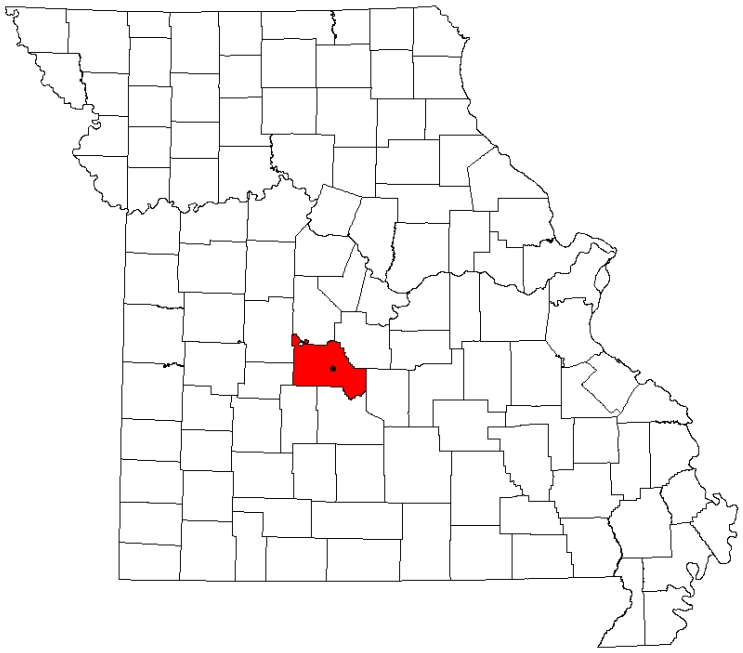
SITE INSPECTION REPORT

Dawson Metal Products Camdenton Facility #2 Site
Camden County, Missouri

March 11, 2019



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

TABLE OF CONTENTS

I. Site Inspection Report

II. Figures

III. Tables

IV. Photographic Log

V. Sampling Documentation

VI. References

I. SITE INSPECTION REPORT

Prepared By:
Missouri Department of Natural Resources

Division of Environmental Quality

Environmental Remediation Program

This Page Intentionally Blank

Table of Contents

1.0 INTRODUCTION……1
2.0 SITE DESCRIPTION..... 2
2.1 Location 2
2.2 Site Description 2
2.2.1 Site Ownership 3
2.3 Operational History 3
2.4 History of Previous and Related Investigations 5
2.4.1 Pre-CERCLA Site Screening..... 5
2.4.2 Abbreviated Preliminary Assessment 6
2.4.3 Camdenton TCE Sites..... 6
2.4.3.1 221 Sunset Drive (Modine Manufacturing Co.)..... 6
2.4.3.1 City Lagoon #3 (Former Hulett Lagoon) 7
2.4.3.1 221 Camdenton Sludge Disposal Area 7
2.4.3.1 Camdenton Treatment Plant Lagoon (C.P. White Lagoon)..... 8
3.0 WASTE CHARACTERISTICS 8
3.1 Trichloroethylene (TCE)..... 9
3.2 Soil Sampling Locations 10
3.2.1 Analytical Results..... 11
3.2.2 Conclusions..... 12
4.0 GROUNDWATER PATHWAY..... 13
4.1 Hydrogeologic Setting..... 13
4.1.1 Soil / Residuum 13
4.1.2 Ozark Aquifer..... 14
4.2 Groundwater Targets..... 15
4.3 Groundwater Sampling Locations and Analytical Results..... 18
4.4 Conclusions..... 18
5.0 SURFACE WATER PATHWAY..... 19
5.1 Hydrologic Setting 19

5.2 Surface Water Targets 20
5.3 Surface Water Sampling and Results 20
5.4 Conclusions 20
6.0 SOIL EXPOSURE AND AIR PATHWAYS 21
6.1 Physical Conditions 21
6.2 Soil and Air Targets 22
6.3 Subsurface Intrusion Pathway Sampling 22
6.3.1 Outdoor Air Sampling Locations 24
6.3.2 Indoor Air and Subslab Vapor Sampling Locations 24
6.4 Subsurface Intrusion Pathway Analytical Results 25
6.4.1 Outdoor Ambient Air Analytical Results 25
6.4.2 Indoor Air Analytical Results 25
6.4.3 Subslab Vapor Conclusions 26
6.5 MDHSS Health Consultation 27
6.6 Subsurface Intrusion Pathway Conclusions 27
6.7 Soil and Air Conclusions 28
6.8 Subslab Depressurization System Installation 28
7.0 DATA QUALITY ASSESSMENT 29
7.1 Groundwater Sampling 29
7.2 Indoor Air Sampling 29
7.3 Subslab Vapor Sampling 30
8.0 SUMMARY AND CONCLUSIONS 31
8.1 Soil Source Area Conclusions 32
8.2 Groundwater Conclusions 32
8.3 Vapor Intrusion Conclusions 33
8.4 Surface Water Conclusions 34
9.0 RECOMMENDATIONS 34

Appendix A – Figures

Figure 1. Site Location Map
Figure 2. 1972 Building Layout
Figure 3. 1995 Facility Aerial Photograph
Figure 4 Dawson #2 Building Additions
Figure 5. Soil Boring Location Map
Figure 6. Indoor Air and Sub Slab Vapor Sample Location Map
Figure 7. Well & Spring Sampling Location Map

Appendix B – -Tables

Table 1. Estimated Population Served By Groundwater Within Four Miles
Table 2. Analytical Results for Drinking Water Wells & Spring Samples
Table 3. Analytical Results for Indoor & Ambient Air Samples
Table 4. Collocated Indoor Air Sample Pair Results
Table 5. Collocated Subslab Vapor Sample Pair Results
Table 6. Analytical Results for Subslab Vapor Samples
Table 7. Analytical Results for Soil Samples
Table 8. Comparison for Mobile GC vs. Laboratory Results of Soil Samples

Appendix C – Photographic Log

Appendix D- Sampling Documentation

Appendix E-References

DATE	**March 11, 2019**
PREPARED BY	**Amanda Branson, Missouri Department of Natural Resources**
SITE	**Dawson Metal Products Camdenton Facility #2, Camden County**
EPA ID	**MON000704622**
C.A. NUMBER	**V99738108**

1.0 INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Missouri Department of Natural Resources (department), through a Cooperative Agreement with the U.S. Environmental Protection Agency (EPA), conducted a Site Inspection (SI) at the Dawson Metal Products Camdenton Facility #2 (Dawson #2) site in Camdenton, Missouri.

The department is currently conducting investigations at five other related TCE sites in Camdenton: 221 Sunset Drive Facility (Modine Manufacturing Co., EPA ID: MOD062439351), City Lagoon #3 (Former Hulett Lagoon, EPA ID: MOSFN0703530), Camdenton Sludge Disposal Area (EPA ID: MOSFN0703532), and Camdenton Treatment Plant Lagoon (C.P. White Lagoon, EPA ID: MON000706666). The 221 Sunset Drive Facility is being investigated and overseen under Resource Conservation and Recovery Act (RCRA) authority. City Lagoon #3, Camdenton Sludge Disposal Area, and the Camdenton Treatment Plant Lagoon are all sites being investigated and cleaned up with department oversite under CERCLA. These sites are shown on Figure 1 (with the exception of the Camdenton Sludge Disposal Area site, which is located outside the extent of the map, 4 miles southeast of the city center of Camdenton.

The purpose of this investigation was to collect information concerning conditions at the Dawson #2 site sufficient to assess the threat posed to human health and the environment and to determine the need for additional investigation under CERCLA or other authority, and, if appropriate, support site evaluation using the Hazard Ranking System (HRS) for proposal to the National Priorities List

(NPL). The investigation included the collection of soil, public and private drinking water well samples, surface water, indoor air, subslab vapor, and outdoor air to identify potential trichloroethylene (TCE) source areas, and assess threats to human health through the relevant exposure pathways.

2.0 SITE DESCRIPTION

2.1 Location

The Dawson #2 site is located at 1225 West U.S. Highway 54 in Camdenton, Missouri. The geographic coordinates for the site as measured from the center of the building are 37.998918 N latitude and -92.763290 W longitude. Figure 1 in Appendix A is a Site Location Map.

The Camdenton area receives an average of 42.32 inches of precipitation annually, and an average of 19 inches of snowfall annually (NOAA, 2019). The 2-year 24-hour rainfall is estimated at 3.5 inches (NOAA, 2019). The average daily temperature during the summer months is 77 ºF, and the average winter temperature is 35 ºF (NOAA, 2019). The average wind speed and direction is approximately 10 miles per hour from the south (NOAA, 2019).

2.2 Site Description

The site is the location of a manufacturing facility that was used for approximately one year starting in July 1972 by Dawson Metal Products. During that time, TCE was disposed of into the environment resulting in soil contamination. The site property occupies approximately 11 acres (Figure 1). The site includes an 80,000 ft² manufacturing building that is currently used to assemble and distribute fishing tackle by Laker Fishing Tackle, a subsidiary of Eagle Claw. Figure 3 in Appendix A provides an aerial photograph view of the site from 1995. The superimposed yellow polygon, labelled Building 1, in Figure 4 (Appendix A) shows the building structures (office and warehouse areas) that were present in 1972 based on former employee statements. Figure 4 also shows changes to the manufacturing building as additions were added over time.

The site is located in a mixed suburban/rural land use area between Camdenton and the Lower Niangua arm of the Lake of the Ozarks. Access to the southern portion of the site is unrestricted and currently used as the gravel parking lot for employees. The northern portion of the site is restricted by a chain linked fence that is locked by the facility manager at the close of each business day. This portion of the site is also a gravel parking lot, but is used for shipping and delivery of products and supplies for Laker Fishing Tackle. The nearest residential property is located approximately 515 feet west of Building 1. Beyond the gravel parking lot on the north end of the property the land turns to a grassy/forested area that slopes downhill to a creek below the site. Surface water leaving the site flows to the north end of the property where it then flows downhill to a creek that leaves the site.

2.2.1 Site Ownership

Department staff searched Camden County records for property ownership (CCAO, 2017). Property ownership exchanged hands multiple times from 1969-1973. In a search of previous property owners, department staff also searched for past operations at this site. In 1969 W.T. Cox Co., Inc. owned and operated at this location. This company is believed to have worked on convertible rail-highway vehicles (FPO, 2019). The current property owner bought the property in 1973 and has owned it since the purchase.

2.3 Operational History

A commercial building located at 221 Sunset Drive, began manufacturing air-conditioning coils and feeder parts from aluminum and copper tubing in the early 1970’s to December 1990 (MDNR, 1999). The manufacturing process required cutting and expanding aluminum and copper to bond the copper tubing with the aluminum fins. TCE was used in vapor degreasers to remove the oil and dirt from the various parts and assembled units before further processing. Sundstrand Tubular Products (Sundstrand) acquired Dawson Metal Products in 1972 and continued to produce

aluminum and copper heat transfer units at the Sunset Drive facility until 1990. On August 24, 1990, Sundstrand agreed to sell the business and assets of Sundstrand Tubular Products, Inc. to Modine Heat Transfer, Inc., a wholly owned subsidiary of Modine Manufacturing Company, a Wisconsin based corporation that operates and conducts business in the state of Missouri. This transaction was closed on October 18, 1990. On April 1, 1997, Modine Heat Transfer, Inc. merged with Modine Manufacturing Company; thus, changing its name to Modine Manufacturing Company. Modine is the current owner/operator of the facility (MDNR, 1999). Both Dawson and Sundstrand used TCE in the vapor degreasers (MDNR, 2017d).

A fire occurred at the 221 Sunset Drive facility on July 9, 1972 caused by spontaneous combustion in the vicinity of a vapor degreasing unit. Dawson employees continued manufacturing at this facility following the fire in areas not damaged in the fire. However, a portion of the operations were moved to 1225 U.S. Highway 54 for approximately one year while fire damages were addressed (SFLP, 1972). The exact ending date for operations at the Dawson #2 is not known, but most reports indicate operations lasted for at least one year, perhaps into the fall of 1973.

Former Dawson #2 employees have reported that for approximately one year beginning in 1972, the Dawson Metal Products company used the 15,000 ft^2 “Building 1 on Figure 3” at 1225 U.S. Highway 54. According to the Camden County Assessor’s Office documents this property was owned by W.T. Cox Co. Inc. in 1972 (CCAO, 2017). Two former Dawson employees reported that degreasing operations at the Dawson #2 facility were conducted by hand by dipping parts into 55 gallon drums that were cut in half and filled with TCE. There were two half drums used in the process, the first for initial dipping to remove larger chunks of grease and debris, then the second drum for final degreasing. When the first drum of TCE became too fouled with grease and was no longer effective, it was disposed of directly onto the ground outside the loading dock area (see Figure 2 for location). The drum was transported with a forklift to the loading dock and tipped on edge to empty the contents onto the ground. One former employee reports that occasionally the

TCE waste drum was transported with the forklift out the side door on the northeast side of the building and disposed of on the ground at the edge of the parking lot. The empty first drum was then refilled with TCE and became the second rinse drum in the process. Employees reported that estimate that multiple ½ drums of waste TCE was disposed of each day. There were two work shifts per day with some work on Saturdays (MDNR, 2017c; MDNR, 2017e)

Jack Dickerson, the current owner of the property, acquired it shortly after Dawson #2 vacated in 1973, and has used it for storage in the past. The original building and others added on over time are currently leased to the Laker Fishing Company. Laker Fishing Co. has been in operation at this location since 2002. All buildings on the site are currently used for manufacturing and storage of fishing tackle and equipment. There are approximately 20-30 full time employees (MDNR, 2018).

Modine Heat Transfer Inc. (Modine), a wholly-owned subsidiary of Modine Manufacturing Co., purchased the 221 Sunset Drive property from Sundstrand in October 1990 and continued producing aluminum and copper heat transfer units until 1997. Modine used 1,1,1-trichloroethane (1,1,1-TCA) in the vapor degreasers from 1990 until 1993, and methylene chloride from 1993 until 1997. Modine Heat Transfer Inc. merged with Modine Manufacturing Co. in April 1997 and changed its name to Modine Manufacturing Co. In February 2009, CLA LLC purchased the property from Modine, who in-turn sold the property to RAASMartin LLC. Modine continued operating at the facility under a lease agreement until 2012 (MDNR, 2017d).

2.4 History of Previous and Related Investigations

2.4.1 Pre-CERCLA Site Screening

A Pre-CERCLA Screening (PCS) was completed for the Dawson #2 site on September 6, 2017 (MDNR, 2017a). The scope of the PCS was limited to reviewing existing data, conducting interviews and a site reconnaissance visit on August 23, 2017. The PCS report concluded that there was evidence for a potential release of TCE at the site and recommended conducting a CERCLA Abbreviated Preliminary Assessment (APA).

2.4.2 Abbreviated Preliminary Assessment

An APA was completed on September 8, 2017 (MDNR, 2017b). The APA was limited to reviewing existing data, further evaluating the likelihood of release and identifying potential exposure routes of concern. The APA report concluded that there was a significant likelihood of a past release of TCE at the site and identified the subsurface/vapor intrusion and groundwater/drinking water pathways as exposure routes of concern. A CERCLA Site Inspection investigation was recommended to conduct environmental sampling to determine whether there was a release and to assess these exposure pathways.

2.4.3 Camdenton TCE Sites

The department is currently conducting investigations at five other related TCE sites in Camdenton: 221 Sunset Drive Facility (Modine Manufacturing Co.), City Lagoon #3 (Former Hulett Lagoon), Camdenton Sludge Disposal Area, and Camdenton Treatment Plant Lagoon (C.P. White Lagoon).

2.4.3.1 221 Sunset Drive (Modine Manufacturing Co.)

The Modine Manufacturing Co., also known as Sundstrand (EPA ID: MOD062439351) or Dawson Metal Products Camdenton #1, site is located on about 69 acres at 221 Sunset Drive (previously 179 Sunset Drive), next to a residential neighborhood in Camdenton (Figure 1 in Appendix A). The department began investigations at the facility in 1992 following a release of 4,500 gallons of TCE. Modine Manufacturing Co. is conducting investigations of contaminant releases at the 221 Sunset Drive facility under a Corrective Action Abatement Order on Consent with the department. The department's Hazardous Waste Program, Permits Section is providing oversight of these activities under authority of the Resource Conservation and Recovery Act (RCRA) (MDNR, 2017d).

2.4.3.1 City Lagoon #3 (Former Hulett Lagoon)

The City Lagoon #3 site, previously known as the Former Hulett Lagoon site (EPA ID: MOSFN073530), is a closed 1-acre field where the wastewater treatment lagoon was formerly located in Camdenton, 500 feet northeast of the intersection of Dawson Road and Sunset Drive (Figure 1 in Appendix A). From 1961 to 1989, the lagoon received domestic sewage, storm water, and untreated industrial wastewater including wastewater from the 221 Sunset Drive facility and other commercial waste streams in addition to domestic sewage. The city closed the lagoon in July 1989 by draining the water and removing the sludge. The City Lagoon #3 site is currently an open field with grassy vegetation, located in a mixed residential/commercial area. The site is surrounded by timber, but does not have a barrier preventing public access. The Hazardous Waste Program's Superfund Section conducted a Combined Preliminary Assessment/Site Inspection (PA/SI) in 1999 at the former lagoon. Groundwater sampling results documented a release of TCE to the Ozark Aquifer, in the area of the City Lagoon #3 site. Hamilton-Sundstrand, parent company of former Sundstrand Tubular Products, entered into a voluntary letter of agreement with the Missouri Department of Natural Resources in 2000 in order to enter Superfund's State Cooperative Program (MDNR, 2017d).

The city of Camdenton’s Mulberry Well (Figure 1 in Appendix A) is located about 600 feet southeast of the 221 Sunset Drive property and 1000 feet south of the City Lagoon #3. TCE was detected in the Mulberry Well and the well was taken offline in 1999. The source(s) of TCE contamination to the well has not been definitively determined, but may include releases from the Sunset Drive facility and City Lagoon #3.

2.4.3.1 221 Camdenton Sludge Disposal Area

The Camdenton Sludge Disposal Area site (EPA ID: MOSFN0703532), located at 20 Airport Drive, is an open field where the sludge was land applied from the 1989 closure of the City Lagoon #3, the city of Camdenton's former wastewater treatment lagoon. Sludge was land applied in a

field north of Forbes Road at the end of the runway at the Camdenton Memorial Airport. A Combined PA/SI investigation was completed by the department at the site in 1999. TCE was not detected in samples from the sludge material and surrounding soil during the investigation. The department initiated a Site Reassessment investigation in June 2017 after receiving new information from a citizen in Camdenton that City Lagoon #3 sludge materials may have been applied on two additional private properties. After interviewing several individuals and examining City of Camdenton records, it was determined that the sludge applied at the two private properties came from the city's existing wastewater treatment facility on Ha Ha Tonka Road and not from the City Lagoon #3 (MDNR, 2017d).

2.4.3.1 Camdenton Treatment Plant Lagoon (C.P. White Lagoon)

This site is the location of one of Camdenton's former wastewater treatment lagoons located 1.3 miles southwest of the Sunset Drive facility. Camdenton Treatment Plant Lagoon (EPA ID: MON000706666) is the current location of Camdenton's wastewater treatment plant. Following up on citizen concerns expressed during a Camdenton Industrial TCE Contamination Advisory Team (CITCAT) meeting, the department identified a period of time between 1987 and 1989, following the decommissioning of City Lagoon #3, when wastewater from Sundstrand's Sunset Drive facility was discharged to this lagoon. The city decommissioned the lagoon in June 1989 when the current treatment plant became operational. The department is currently conducting an investigation of potential TCE impacts in the Camdenton Treatment Plant Lagoon area.

3.0 WASTE CHARACTERISTICS

TCE degreasing waste is reported to have been released directly into the environment on the ground surface at the site. Former Dawson #2 employees have reported that 25,740 gallons (1/2 drum per shift, 3 shifts/day, 6 days a week, for 12 months) of waste TCE may have been released onto the ground surface off the northern loading dock of Building 1 and the northeastern portion of the property beyond the parking lot (Figure 2 in Appendix A, MDNR, 2017c, MDNR, 2017e).

disposed of onto the ground surface off the northern loading dock of Building 1 and/or the northeastern portion of the property beyond the parking lot. Based on historic manufacturing and waste disposal practices by Dawson/Modine and allegations by former employees, the primary CERCLA-eligible contaminant of concern at the site is TCE. When released to the subsurface, under certain conditions, TCE can be transformed to cis-1,2-dichloroethene (cis-1,2-DCE), 1,1-dichloroethene (1,1-DCE), vinyl chloride and to a lesser extent trans-1,2-DCE. Therefore, based on investigation findings these hazardous substances are also be considered contaminants of concern.

3.1 Trichloroethylene (TCE)

The following is a summary of information in the Agency for Toxic Substances Disease Registry Toxicological Profile for trichloroethylene (ATSDR, 2015). Trichloroethylene is a nonflammable, colorless liquid at room temperature with a somewhat sweet odor. It is mainly used as a solvent to degrease metal parts, but is also used in some household products including paint removers, adhesives, and spot removers. TCE is a very commonly used chemical, and about 400,000 workers are routinely exposed to it in the United States. TCE quickly evaporates at room temperatures, and is most commonly released to air from industrial processes. It can also enter soil and water when disposed at chemical wastes sites. The compound is only slightly soluble in water. It is a dense non-aqueous phase liquid (DNAPL), which has a higher density than water.

Once released to the atmosphere, TCE will persist for several hours to several months, until being broken down by sunlight. Most TCE evaporates within several hours to several weeks in surface water. Because it is denser than water, any remaining TCE will settle to the bottom of the water body. It is not likely to bio-concentrate in aquatic life, or adsorb significantly to sediments and soils. In soils, due to its volatility and low adsorption to soil, TCE will evaporate quickly and/or rapidly leach into the groundwater. Once in the groundwater, liquid TCE will migrate downward until meeting a less permeable layer. Microbial degradation and abiotic transformation of TCE in groundwater can produce cis- 1,2- DCE, 1,1-DCE and vinyl chloride.

TCE exposure is most common through inhalation of vapors or direct contact of the solvent with skin. Acute exposure to high levels of TCE can cause dizziness, sleepiness, headaches, and skin rashes. There is strong evidence that TCE can cause kidney cancer in people and some evidence for liver cancer and malignant lymphoma. The International Agency for Research on Cancer (IARC) and EPA have classified TCE as carcinogenic to humans. EPA designates TCE as a CERCLA hazardous substance with a reportable quantity pursuant to the Clean Water Act, Clean Air Act, and Resource Conservation and Recovery Act. A recent review of developing toxicity and exposure data by the EPA in 2016 resulted in a lowering of the recommended health-based screening and action levels for use in CERCLA site assessment investigations (EPA, 2016).

3.2 Soil Sampling Locations

The department selected initial soil boing locations near the former loading dock based on the reports from one former employee (MDNR, 2017c). Site Inspection sampling was conducted before a second employee contacted the department with information about the second area of TCE waste disposal located at the edge of the parking lot (MDNR, 2017e). Soil samples were collected from various depths and screened for volatile organic chemicals (VOCs) using field analytical methods. Subsequent boring locations were selected based on initial findings using a dynamic work plan strategy to estimate the vertical and lateral extent of contamination in the overburden. The department collected a total of 23 soil samples from nine borings at depths ranging from zero to 17 feet adjacent to and northeast of the loading dock area on October 3-4, 2017. Sampling locations are show in Figure 5 and Photographs 1-7. Soil Boring 06 was designated as a background soil sample (Sampling Report; Appendix D-Sampling Documentation). Weathered bedrock was encountered by staff between 11.5 feet and 15 feet (Appendix D-Sampling Documentation). A brief description of the sample collection techniques and screening methods is provided below and more fully described in the SI Sampling and Analysis Plan (SAP) (Appendix D-Sampling Documentation).

Soil coring was conducted using a truck-mounted hydraulic push probe. At each boring location, probes were advanced at 4-5 foot intervals from the surface to refusal and 2.125-inch diameter soil cores collected in acetate sleeves. Soil cores were field-logged, photographed and screened with a photoionization detector (PID). At selected depth intervals, soil samples were collected for analysis based on the PID results, and analyzed in the field with a mobile gas chromatograph equipped with a PID detector in accordance with SOP MDNR-DEQ-HWP-4000 (Sampling Report; Appendix D-Sampling Documentation).

Selected soil samples were submitted to the department's fixed based analytical laboratory in Jefferson City for analysis by EPA SW-846 Method 8260B. Some soil samples were also screened in the field for the presence of DNAPLs using a Sudan IV dye color indicator test kit. Soil boring photographs and log forms are provided in Appendix C and Appendix D, respectively.

3.2.1 Analytical Results

All soil sample results are summarized in Table 7 in Appendix B and the range of TCE results are also reported on Figure 5 of Appendix A. Soil Boring 06 was designated as a background soil sample due to its non-detection of TCE. TCE was detected significantly above background in 14 of the 23 soil samples collected and analyzed by the department laboratory and noted to be higher in the depths of 10 to 13 feet. Soil Borings 01, 02, and 08 had the highest level of TCE ranging between 0.1-0.5 mg/kg (ppm). TCE breakdown products, including cis-1,2-dichloroethene and vinyl chloride, were also detected in many of those samples.

Results were compared to EPA Regional Screening Levels (RSL) (EPA, 2015). Nine soil borings have TCE levels above the EPA screening level for migration to groundwater of 0.0018 mg/kg. Results from the mobile GC were compared to the PID field screening and results from the

department's laboratory. Comparison of the mobile GC results to the lab results did not correlate well (Table 8 in Appendix B).

3.2.2 Conclusions

Soil sampling results document a release of TCE to the subsurface at the site. TCE was detected in six of the nine soil samples collected by the department; three had levels of TCE between 0.05-0.075 ppm and three had levels of TCE between 0.1-0.5 ppm. Cis-1,2-DCE and vinyl chloride were also detected indicating that some degradation of TCE has occurred in the subsurface over time. Contamination was detected primarily below the surface soil at depths greater than three feet indicating that exposure through direct contact with contaminated soil is unlikely. However, concentrations exceed benchmarks for migration to groundwater indicating that residual TCE in the soil could migrate into groundwater beneath the site. Vapors from residual TCE contamination in the soil adjacent to the loading dock have been documented as migrating below the Dawson #2 Building 1, results are discussed in Section 6.3. TCE was detected in soil from SB-09, 75 feet northeast of the loading dock, being the furthest sampling location away from the loading dock. TCE was noted to be higher between the depths of 10 and 13 feet. Therefore, the full horizontal extent of TCE contamination is not known and further sampling will be needed characterize the TCE release. The TCE results should be considered as potentially biased low due to the likelihood of volatile organic compounds (VOC) losses during sample collection and handling in the field and in the laboratory.

Since Site Inspection sampling was conducted before the department had knowledge of the reported additional TCE disposal area at the edge of the parking lot, further investigation would be necessary in this area to determine if there is an additional source area.

4.0 GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

The Ordovician-age Gasconade Dolomite and Roubidoux Formation underlie the Dawson #2 site. These formations are part of the Ozark Aquifer. There are no known confining layers between the ground surface and the water table that would prevent migration of surface contaminants from reaching the aquifer at or near the location of the sites. In the case of this site, the bedrock has substantial secondary porosity development, or karst. The local classified losing stream segments, springs, caves, and 10- to 65-foot voids encountered in local wells attest to this. Information about the hydrogeology of the site was provided by the Missouri Geological Survey (MGS) in a 1999 report and a 2017 addendum (MGS, 1999; Bachle, 2017).

4.1.1 Soil / Residuum

Grading and filling was likely done at the site prior to construction of the buildings, which has occurred in phases over time. The depth and composition of these fill materials is unknown. The first native material beneath the fill is Roubidoux Formation residuum, the upper portion of which consists of silty sandy red clay with chert fragments. The lower portion of the residuum contains relict sandstone, chert beds, and residual clay from deep weathering of the Roubidoux Formation. The predominant soil type is expected to be clay. Based on the depth to probe refusal, the thickness of the soil/residuum at the site is between 12 and 17 feet (Appendix D: Soil Boring Log). Waste TCE released to the surface would be expected to move vertically through more permeable layers of silt, sand and chert fragments, possibly spreading out horizontally along less permeable clay lenses before again finding more permeable material allowing further vertical penetration. Depending on the mass of TCE released, DNAPL may have reached the bedrock surface. Due to the age of the TCE release (45 years ago), depending on the specific subsurface characteristics at the site, it is possible that the bulk of the solvent has migrated vertically into the bedrock formation, leaving only residual mass in the overburden materials.

4.1.2 Ozark Aquifer

The formations above the Davis Shale form the unconfined Ozark Aquifer. The Gunter Sandstone is generally highly porous and permeable and is an important source of domestic groundwater supplies in the area. Because the Gunter Sandstone generally yields adequate domestic water supplies, few private wells in the area penetrate to the underlying Cambrian Formations. However, municipal wells in the Lake of the Ozarks area are generally cased into the Gunter Sandstone, in order to avoid possible bacterial contamination (MGS, 1999).

According to drinking water well data, the water table within the Ozark Aquifer near the Dawson #2 site lies close to the same elevation as the Lake of the Ozarks; between 660 to 675 feet above mean sea level (amsl). Therefore, the estimated depth to groundwater in the Ozark Aquifer beneath the Dawson #2 site is 285 to 300 feet below ground surface (bgs). TCE has been detected in the Mulberry Well which is cased to 400 feet and has a total depth of 900 feet (Bachle, 2017).

Since the Mulberry Well is located approximately ¾-mile away in an up groundwater gradient direction (based upon monitoring well data from the 221 Sunset Drive and City Lagoon #3 sites), it is unlikely that the Dawson #2 site is contributing contamination to the Mulberry Well. Due to the ¼-mile distance of the site to the well, the existence of dissolution channels in the bedrock, and the unknown extent of the capture zone for the Blair Heights Well (Figure 1 in Appendix A), there is a possibility that contaminants originating at the Dawson #2 site could impact the Blair Heights Well, however, the likelihood is low since the well is up groundwater gradient from the site (Bachle, 2018). Based upon static water level data from the Logmain and Well Information Management System (WIMS) databases, there is a steep groundwater gradient toward the Lake of the Ozarks. Therefore, the dissolved phase of the chlorinated solvent plume most likely will migrate west, toward the lake (Bachle, 2017).

Since the bedrock in the area appears to have high karst development, the delineation of a contaminant plume may be complex. The contaminant plume may extend further by entering cave streams, take preferential pathways and miss proximal wells, disperse laterally along more competent bedrock bedding planes, or get drawn toward high yield wells. Adding to the lateral complexity of the plume is the possible existence of domestic wells at now-non-existent residences documented to be located at the south corner of the Dawson #2 site property prior to 1968. Improperly abandoned wells can create preferential downward migration pathways (Bachle, 2017).

4.2 Groundwater Targets

Residents in the City of Camdenton, population 3,718, obtain drinking water from a public system drawing water from the Ozark Aquifer. There are also a number of nearby private wells listed in MGS databases in areas not served by the public surface water supply system. Municipal and public water supply districts cover a small portion of the 4-mile well survey area. Therefore, most residential homes and businesses outside of Camdenton and the water supply districts may have a private drinking water well (Bachle, 2017).

The Ozark aquifer produces up to 750 gallons per minute and is known to provide water for 510 recorded wells within 4 miles of the site. Because the Ozark Aquifer generally yields adequate domestic water supplies, few private wells in the area penetrate to the underlying Cambrian Formations. Municipal wells in the Lake of the Ozarks area are generally cased into the Gunter Sandstone, in order to avoid possible bacterial contamination from surface water infiltration (Bachle, 2017).

The City of Camdenton is served by three public wells; Blair Heights Well #4, Hickory Well #7, and North Rodeo Well #8. The city also has a fourth well, the Mulberry well, that was taken off line on February 2, 1999 due to TCE contamination. The Blair Heights Well # 4 is located approximately 0.3 miles north from the Dawson Metal Products site. North Rodeo Well # 8 is 1.3

miles northwest of Dawson Metal Products. Hickory Well # 7 is located 1.6 miles northwest of the site. These wells range in depth from 800 to 1100 feet below ground surface (bgs). These wells were constructed from 1936 to 1997. These wells are operated cyclically or based upon usage demands (SECOR, 2003).

The MGS databases contain records of 18 non-community public, 29 community public, 4 municipal, and 459 domestic wells within a 4-mile radius of the site. Some wells listed in the Logmain database may no longer be used. Prior to 1987, registry of private wells was not required, so some existing older wells may not be included in the database. Because of these exceptions, the databases may not accurately depict water well usage in this area (Bachle, 2017).

The nearest domestic drinking water well on record nearest to the site is located approximately 0.5 mile northwest of the site (Figure 1; Appendix A). The nearest public well in MGS databases is Blair Heights Well located approximately 0.3 miles northeast of the site. There are 18 active non-community water systems within 4 miles of the site (Bachle, 2017). Table 1 below provides a summary of the population served by public and private wells in various distance radii from the site (MDNR, 2017e).

Table 1: Estimated Population Served By Groundwater Within Four Miles of the Dawson Metal Products Camdenton Facility # 2 Site

Distance (In Miles)	Number and Type of Wells	Total Population Served By Public Wells	Number of Private Wells	Total Population Served by Private Wells[1]	Total Population Served By Groundwater
0-1/4	City of Camdenton's Blair Heights Municipal Well	1240	1	2	1242
>1/4-1/2			4	9	9
>1/2-1			5	11	11
>1-2	City of Camdenton's Rodeo Well & City Hall Well	1484	115	269	3618
	(4) Non-community Public Wells	455			
	(6) Community Public Wells	1410			
>2-3	(1) Non-community Public Wells	75	155	362	1207
	(4) Community Public Wells	770			
>3-4	(1) Municipal Wells	244	177	417	1811
	(2) Non-community Public Wells	690			
	(2) Community Public Wells	460			
TOTAL		**6828**	**457**	**1070**	**7898**

[1] The number of people served per private well was estimated by multiplying the average household size of 2.34 persons per household in Camden County by the number of wells within a distance category (USCB, 2007).

4.3 Groundwater Sampling Locations and Analytical Results

Department staff contacted residences in the area via mail and conducted a door to door survey to find private wells within a one mile radius of the Dawson #2 site. Seventeen private wells and one public well, the Blair Heights well, were sampled on October 2, 2017 for VOCs. Drinking water samples were submitted to the department's laboratory for comparison analysis and were analyzed by EPA Drinking Water Method 524.2. The private well located at Loc. ID 120 was designated as a background well due to it being up gradient of the groundwater flow direction on site. All wells sampled and analyzed were non-detect for all VOC's including TCE. Sampling locations are shown in Figure 7 in Appendix A and photographs 22 & 23. All sampling documentation is included in Appendix D.

4.4 Conclusions

The site is underlain by the Ozark Aquifer; this puts the depth to groundwater for the Dawson #2 site at 285 to 300 feet bgs. Bedrock is documented to be at 50 feet around the site. Private and public wells draw water from the Ozark Aquifer, and range in depth from 97 feet to 530 feet (private), 300 to 1,500 feet (public). There are seventeen private domestic drinking wells and three municipal wells within a 1.5 mile radius of the Dawson #2 site. Seventeen private wells and one public well were sampled as part of the SI on October 2, 2017. No TCE or other VOCs were detected in any of the wells sampled.

Groundwater was not encountered nor collected from the bedrock interface during SI sampling in the loading dock area. A release to groundwater from disposal of TCE waste in the loading dock area during the one year of operations at the Dawson #2 is possible, however, groundwater was not encountered during SI sampling on site. Target sampling of private wells nearest the site and the closest public wells did not show any detections of TCE.

5.0 SURFACE WATER PATHWAY

5.1 Hydrologic Setting

Surface water runoff leaving the site flows north across the parking lot before descending the steep hill and entering an unnamed losing stream segment, approximately 800 feet from the site. The unnamed stream drains toward the west for 1 mile before entering the Lake of the Ozarks (Bachle, 2017). This stream changes to gaining near the lake level, meaning the surface water entering the ground along the losing length of the stream begins to discharge to the surface near the lake.

On August 23, 2017, MGS personnel were on-site and observed that a small area of surface water had pooled along the southwest side of the building and was flowing into the steep valley located northwest of the building (Bachle, 2017). It had been several days since the last rain fall, which indicates that the ground near the facility was saturated at the time of the site visit. It is not currently known whether this observation may indicate the presence of an intermittent perched water table in the unconsolidated material beneath the site.

If there was a release to groundwater, plume migration from the site would generally be toward the west and has the potential to impact springs that lie between the site and the lake. The department chose two nearby springs to sample in this investigation (Figure 7 in Appendix A); Cullen Spring (elevation 700 feet amsl) and an unnamed spring (elevation 740 feet amsl). Cullen Spring lies approximately 0.5 miles southwest of the site along an unnamed intermittent stream, and discharges at 1.0 cubic feet per second. The unnamed spring is located approximately 0.5 miles south of the site, with an unknown discharge rage. No dye tracing studies have been conducted to identify potential recharge areas for these springs (MDNR, 2017c).

5.2 Surface Water Targets

There are no drinking water intakes within 15 miles downstream of the site, which essentially includes the Lake of the Ozarks. The Lake of the Ozarks is classified as a 1.3 body of water. It is classified for livestock and wildlife protection, protection of warm water habitat and human health protection, whole body contact recreation, and secondary contact recreation. The Indiana bat (*Myotis sodalis*, federal- and state-listed endangered) and Northern long-eared bat (*Myotis septentrionalis*, federal-listed threatened) may occur near the project area. Bald Eagles (*Haliaeetus leucocephalus*) may nest near streams or water bodies in the project area. While no longer listed as endangered, eagles continue to be protected by the federal government under the Bald and Golden Eagle Protection Act (MDC, 2018).

5.3 Surface Water Sampling and Results

Surface water samples were collected on October 2, 2017; one from Cullen Spring and one from an unnamed spring. Sampling locations are shown in Figure 7 and Photographs 8 & 9. A trip blank was prepared with the sample containers and accompanied the samples. Samples were submitted to the department's laboratory for analysis of VOCs using EPA Drinking Water Method 524.2, even though neither spring provide drinking water. No TCE or other VOCs were detected in any of the samples. Analytical results are shown in Table 2 and provided in Appendix D.

5.4 Conclusions

The primary contaminant of concern for this investigation is TCE released to the surface of the ground at the site in 1972. Since TCE is a volatile compound, it is unlikely that it would persist for over four decades in soils exposed to surface water runoff at the site. Surface water leaving the site flows north approximately 800 feet where it enters an unnamed losing stream that drains toward the west for 1 mile before entering Lake of the Ozarks. This stream changes to gaining near the lake level, meaning the surface water entering the ground along the losing length of the stream begins to discharge to the surface near the lake.

Sampling of the unnamed stream was not conducted as part of the SI due to the low likelihood of a release from surface runoff at the site. In addition, VOCs would be expected to rapidly partition to the atmosphere upon discharge to surface water. Therefore, the risk of exposure though the surface water pathway is considered relatively low at the site; however, knowledge about contaminant concentrations in spring discharges could be useful in assessing overall contaminant fate and transport (Bachle, 2017). Surface water samples collected from two nearby springs contained no detectable concentrations of TCE or other VOCs. Based on these findings and considerations, there does not appear to have been a release of TCE to surface water at the site and no further assessment of the pathway is warranted. Department staff did not encounter any surface water on site during the sampling event.

6.0 SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

Based on boring logs prepared from the October 2017 sampling event, overburden material at the Dawson #2 site includes approximately 1 foot of gravely fill material underlain by clay and cherty clay interspersed with sandy silt and gravel lenses (Appendix C: Photographic Log, Appendix D: Soil Boring Log Form). Weathered dolomite bedrock was observed in borings SB-01 and SB-08.

The uppermost bedrock at the site is Gasconade Dolomite. Since the Gasconade Dolomite is one of the formations included in the Ozark Aquifer and no confining layers exist within the Gasconade Dolomite, any contaminants entering the saturated portion of the Gasconade Dolomite (entering groundwater) will result in contamination of the Ozark Aquifer. This is true for any TCE entering groundwater in saturated bedrock at the Dawson Metal Products #2 site (Bachle, 2018). Faults and folds have been mapped within the 4-mile groundwater target radius. Well log data suggest unmapped faults may also affect the area.

The site property occupies approximately 11 acres. The site includes an 80,000 ft² manufacturing building on site. Access to the southern portion of the site is unrestricted and currently used as the gravel parking lot for employees. The northern portion of the site is restricted by a chain linked fence that is locked by the facility manager at the close of each business day. This portion of the site is also a gravel parking lot, but is used for shipping and delivery of products and supplies for Laker Fishing Tackle.

6.2 Soil and Air Targets

The site is currently leased by the Laker Fishing Tackle Company to assemble and distribute fishing tackle as well as storage for fishing equipment. Department staff noticed numerous stacks of ice fishing sleds on site. The facility consists of a small area of closed door office spaces, a breakroom for employees and a 78,000 ft^2 open warehouse workspace. Approximately 20-30 full time employees work 10 hour shifts Monday through Thursday. The company staff use the entire facility on a regular basis since there is not a work station area.

The nearest residence to the Dawson Metal Products facility is located 600 feet to the west of the property. The population within the City of Camdenton is 3,718 at the 2010 census. Within one mile of the Dawson Metal Products facility the population is 1,653 and within four miles of the site the population is 8,823 according to the 2010 census.

6.3 Subsurface Intrusion Pathway Sampling

Employees could potentially be exposed to contaminated soil by direct contact or to TCE vapor inside the building through subsurface intrusion. Direct contact with contaminated surface soil is unlikely since TCE is a volatile compound and the suspected release occurred over four decades ago. Therefore, sampling for this pathway focused on subsurface intrusion.

A vapor intrusion field form was completed by Laker Fishing Tackle in January 2018 to conduct an inventory of potential indoor VOC sources present in the facility (Appendix D). Potential indoor

air sources were discussed prior to the sampling event, however the vapor intrusion field form was completed after the sampling. Multiple petroleum hydrocarbon based products were observed in the facility, including fuel and spray paint. Multiple cans of aerosol adhesive used in the construction of equipment were observed on a storage shelf in Room 1. These products could contribute to benzene, naphthalene, and acetone concentrations detected in the indoor air of the facility. However, no indoor VOC sources containing TCE were identified.

A sampling event was conducted on October 2-4, 2017. Two outdoor ambient air samples were collected from near the facility. Thirteen indoor air samples, including one quality control (QC) sample, were collected from the warehouse spaces, bathroom, breakroom and other enclosed office spaces. Fourteen subslab vapor samples, including one QC sample, were collected in locations generally paired with the indoor air sample locations. All sample locations are shown in Figure 6 in Appendix A. Vapor intrusion sampling was conducted through the entire facility.

Building 1 (the original building) and others have been added onto over time are currently leased to the Laker Fishing Company. The superimposed yellow polygon, labelled Building 1, in Figure 4 (Appendix A) shows the building structures (office and warehouse areas) that were present in 1972 based on former employee statements and are referred to as the original building. Figure 4 also shows changes to the manufacturing building as additions were added over time. Due to the additions onto the Building 1, Department staff sampled subslab and indoor air in each addition to the facility (Figure 6). In 1972, Dawson Metal Products used Room 1 of Building 1 for their degreasing operations. The loading dock that was used in the disposal of the TCE on site is connected to Building 1, therefore making vapor intrusion a concern (MDNR, 2017c; MDNR, 2017e).

6.3.1 Outdoor Air Sampling Locations

Two outdoor ambient air samples were collected from the parking lot areas approximately 100 feet north and south of the building on October 2, 2017 (Figure 6 in Appendix A and Photograph 10 in Appendix C). Samples were collected in a 6 liter summa canister over a 9 hour period from the breathing zone height. The department chose to do a 9 hour sampling period to best reflect the workers exposure given they generally work a 10 hour shift.

6.3.2 Indoor Air and Subslab Vapor Sampling Locations

Indoor air samples were collected from 12 locations inside the building on October 2, 2017 (Figure 6 and Photographs 11-17). A duplicate indoor air sample was collected in Room 1. All samples were collected from breathing level height over a 9 hour period into 6 L summa canisters

All indoor air sampling was conducted prior to installation of the subslab sampling ports and collection of subslab vapor samples. An inventory was prepared cataloging the potential indoor sources of VOCs present in the building, and results did not document any sources of TCE containing materials associated with current operations (MDNR, 2018). Because indoor air sampling was conducted during normal business hours, the facility doors, including the overhead doors, were open to allow for continued operation. Laker Fishing Tackle use these doors all year long regardless of the outside temperature for their shipping and delivering. The following rooms had a door open to the ambient air; Room 1, Room 2, Room 3, Room 5, and Room 6.

Subslab vapor samples were collected from the 13 locations throughout the building on October 4, 2017 as shown in Figure 6 (Appendix A) and Photographs 18-21 (Appendix C). A collocated sample was collected in Room 1 of the building.

6.4 Subsurface Intrusion Pathway Analytical Results

All indoor and outdoor air and subslab vapor results are summarized in Tables 3-6 (Tables 3 & 6 in Appendix B). Results were compared to the most recent EPA Vapor Intrusion Screening Levels (VISLs) (EPA, 2017). In addition, TCE results were compared to the updated EPA Region 7 Action Levels for a commercial exposure scenario (EPA, 2016). All vapor intrusion samples were submitted to the Eurofins laboratory in Folsom, California for analysis of VOCs by EPA Method TO-15 operated in SIM mode.

6.4.1 Outdoor Ambient Air Analytical Results

No TCE or breakdown products were detected in outdoor air. Outdoor ambient air sampling results are summarized in Table 3 in Appendix B. The following compounds were detected in outdoor air but at concentrations below the VISLs that do not require action; benzene, toluene, ethylbenzene, carbon tetrachloride, chloroform, 1,2 dichloroethane, dichlorodifluoromethane, meta-, para-, and ortho-xylenes.

6.4.2 Indoor Air Analytical Results

Indoor air sampling results are summarized in Table 3 in Appendix B. TCE was detected in indoor air samples collected from Rooms 1, 2 and 3, the bathroom and breakroom. The maximum TCE concentration was 2.1 ug/m^3 measured in Room 1, 0.82 ug/m^3 measured in Room 2, and 0.4 ug/m^3 measured in Room 3. These detections are far below the TCE action level for commercial exposure of 6.0 ug/m^3. Vinyl chloride was detected above background ambient air concentrations in Rooms 3, 7 and 8. The maximum vinyl chloride concentration was 0.17 ug/m^3 measured in Room 8, below the vinyl chloride screening level of 2.8 ug/m^3 and action level of 28 ug/m^3.

The aromatic hydrocarbons benzene, toluene, ethyl benzene and xylenes (BTEX) were detected in a number of the samples at concentrations significantly above background ambient air concentrations. These compounds are commonly present in indoor and outdoor air, and were also

detected in the background ambient air samples as indicated above. The benzene concentration of 1.9 ug/m^3 in the office area sample, exceeded the screening level of 1.6 ug/m^3, but not the action level. Ethyl benzene concentrations exceeded the screening level in Rooms 4, 5, 7, and 8, but were not above the action level. Toluene and xylene concentrations were below the screening levels.

1,2-Dichloroethane was detected in several samples at concentrations significantly above background ambient air levels, but none exceeded the EPA VISL action level of 4.7 ug/m^3. The compounds carbon tetrachloride, chloroform, and dichlorodifluoromethane were also detected in the indoor air but at concentrations well below screening levels.

6.4.3 Subslab Vapor Conclusions

TCE was detected in samples collected from Rooms 1 and 2. The maximum concentration of 20,000 ug/m^3 measured beneath Room 1 exceeds the action level of 290 ug/m^3. The TCE breakdown product cis-1,2-dichloroethene was also detected in the subslab vapor beneath Room 1 (no screening level is available for comparison). As indicated in Figure 6, Room 1 is in the back of the building nearest the old loading dock where the TCE waste disposal occurred. The level of TCE detected in the subslab of Room 2 was 8.5 ug/m^3, below the action level of 290 ug/m^3 and the screening level of 100 ug/m^3.

Benzene was detected in the sample collected from beneath Room 7 slightly above the laboratory reporting limit but an order of magnitude below the screening level. Similarly, ethylbenzene, toluene and xylenes were also detected in several samples but at concentrations well below screening and action levels. Several aromatic hydrocarbons and other compounds including various ketones and alcohols were also detected in subslab vapor beneath the building, but at concentrations significantly below screening levels. The chlorinated compounds 1,1,1-trichloroethane (Room 5) and tetrachloroethene (Room 1) were also detected at concentrations significantly below screening levels.

6.5 MDHSS Health Consultation

The Missouri Department of Health and Senior Services (MDHSS) reviewed data from the 2017 Pre-CERCLA Screening, the 2017 Abbreviated Preliminary Assessment report, and this investigation and prepared a Health Consultation identifying potential health risks from vapor intrusion (MDHSS, 2017). MDHSS concluded that subslab vapor sampling indicated there were potential health concerns for individuals working in the building through the vapor intrusion pathway. Although indoor air levels of TCE did not exceed health-based comparison levels during the October sampling, only limited data from this one-time sampling event is currently available and indoor air levels may fluctuate over time. Indoor air levels were not worst case scenario due to the facility doors being opened during the time of the sampling. MDHSS recommended preemptive mitigation actions be implemented to ensure the protection of individuals working at the facility (MDHSS, 2017).

6.6 Subsurface Intrusion Pathway Conclusions

TCE was not detected in background ambient air near the site, and a building inventory identified no potential indoor sources of TCE. Sampling results document a release of TCE to subslab vapor and indoor air at the site. TCE was detected in paired subslab vapor and indoor air samples, specifically in Room 1 and Room 2. Room 1 is in the southern portion of the building near the former loading dock where TCE waste was disposed. This data documents that the subsurface intrusion pathway is complete at the site. Further, the presence of cis-1,2-DCE in both the subslab vapor and indoor air is significant because there are no known common indoor sources of this compound. Therefore, its presence in indoor air provides an additional line of evidence for a subslab vs. indoor source.

The concentration of TCE in subslab vapor beneath Room 1 exceeded action levels by two orders of magnitude indicating there is a potential for intrusion into the building at levels that could pose a health risk to inhabitants. TCE levels beneath Room 2 did not exceed the action level. TCE

concentrations measured in indoor air in both Rooms were below screening and action levels. However several exterior doors were open to allow for continued operation during the duration of sample collection. TCE concentrations during business hours where doors are closed could potentially be higher. During the winter months the doors are closed more often than the summer months when they are open for better ventilation.

Benzene was measured in both subslab vapor and indoor air samples. However, none of the levels exceeded screening or action levels, furthermore, subslab vapor concentrations were below the screening levels and would not fully account for the concentrations measured in the indoor air.

6.7 Soil and Air Conclusions

A release of TCE to the unconsolidated material beneath the site has been documented at the site. Data documents that the contaminated soil in the loading dock area has resulted in contamination of subslab vapor beneath portions of the building at levels above EPA commercial vapor intrusion action level of 290 ug/m3. However, indoor air concentrations of TCE did not exceed the action level, indicating employees are not exposed to TCE levels in indoor air above a level of health concern.

Based on a review of these findings, MDHSS recommended preemptive mitigation actions be implemented to prevent the potential for future exposure risk. There are approximately 20-30 full time employees in the facility.

6.8 Subslab Depressurization System Installation

In response to vapor intrusion sampling results at the Dawson #2 site, in October 2017, UTC voluntarily installed a subslab depressurization system (SSDS) at the facility in Room 1. The subslab depressurization system creates a negative pressure below the floor to prevent migration of constituents from the sub-slab area into indoor air. Following a SSDS pilot scale test and

design work, the full scale SSDS was installed in June 2018 and has operated continuously since that time.

Post mitigation indoor air sampling conducted on October 16, 2018 in the area above the SSDS showed that concentrations of chlorinated volatile organic compounds (CVOCs) were not detected above the method detection limits (MDLs), all of which are below the EPA vapor intrusion screening levels (VISL) for industrial/commercial settings. These results continue to demonstrate that the indoor air remains below the action level. The SSDS appears to be operating properly and post mitigation sampling has documented that vapor intrusion is not taking place.

7.0 DATA QUALITY ASSESSMENT

7.1 Groundwater Sampling

A trip blank was processed and analyzed along with the groundwater samples collected. No VOCs were detected in the trip blank.

7.2 Indoor Air Sampling

Collocated summa canister sample pairs were collected from Room 1. Results for the collocated sample pairs are summarized in Table 4.

TABLE 4: CALCULATION OF SAMPLE/ COLLOCATED SAMPLE RELATIVE PERCENT DIFFERENCE (RPD) INDOOR AIR SAMPLES DAWSON METAL PRODUCTS CAMDENTON FACILITY #2, CAMDENTON, MISSOURI

All results are in ug/m^3

Sample ID	IA-01	IA-01 CL	RPD
Laboratory Number	AD08989	AD08990	
Date Collected	10/2/2017	10/2/2017	
Volatile Organic Compounds (VOCs)			
Benzene	1.60	1.60	0.0
Trichloroethene	2.10	2.10	0.0

Due to the relative ease of mixing of ambient air inside building spaces, any significant difference in collocated indoor air sample pairs observed would be expected to represent low sampling and analysis precision rather than actual differences in air contaminant concentrations across short spatial scales (3 feet). The relative percent difference (RPD) between contaminant concentrations measured in each collocated sample pair was below 10% indicating a high level of sampling and analysis precision.

7.3 Subslab Vapor Sampling

Collocated sample pairs were collected from locations approximately 3 feet apart in Room 1. Results for each collocated sample pair are summarized in Table 5. Dilution was performed on samples SS-13 #173845 - Room 1, SS-02 #173846 - Room 1 and SS-03 #173847, Room 1 co-located due to the presence of high level target species (Appendix D: Eurofins Sample Results).

TABLE 5 CALCULATION OF SAMPLE/ COLLOCATED SAMPLE RELATIVE PERCENT DIFFERENCE (RPD) SUBSURFACE VAPOR SAMPLES DAWSON METAL PRODUCTS CAMDENTON FACILITY #2, CAMDENTON, MISSOURI

All results are in ug/m^3

Sample ID	SSV-02	SSV-03 cl	RPD
Laboratory Number	AD09008	AD09009	
Date Collected	10/4/2017	10/4/2017	
Volatile Organic Compounds (VOCs)			
Benzene	<28	<36	25
cis-1,2-Dichloroethene	<35	<45	25
Tetrahydrofuran	41	40	2
Trichloroethene	11,000	20,000	58

As noted above, collocated indoor air sampling results would be expected to yield similar results when the overall sampling and analysis precision is in control since, due to air mixing one does not expect spatial variability over short scales. However, this assumption is not made with subslab vapor sampling results since it is possible for there to be a high degree of variability in

concentrations beneath a slab even across short spatial scales. Therefore, the subslab vapor data are used not only as a measure of overall sampling and analysis precision as with collocated indoor air samples, but also as an indicator of potential short scale heterogeneity in vapor concentrations beneath the slab. The relative percent difference between collocated subsurface vapor sampling pairs is high with a value of 58% for TCE. This result indicates that a high degree of shorts-scale heterogeneity in TCE concentrations may be present beneath the building and individual subslab sampling results may not be representative of significant volumes of vapor beneath the building.

Leak checks were conducted on all subslab sampling ports prior to collection of subslab vapor samples as described in the SAP (Appendix D). All sampling ports passed the leak check procedure indicating that the sampling ports made a leak-tight connection with the slab and that the subslab vapor samples were not affected by atmospheric air.

8.0 SUMMARY AND CONCLUSIONS

Dawson Metal Products constructed a commercial building at 221 Sunset Drive, Camdenton, MO in 1967 and began manufacturing air-conditioning coils and feeder parts from aluminum and copper tubing. A vapor degreasing process was used to remove the oil and dirt from the various parts and assembled units before further processing. Sundstrand Tubular Products acquired Dawson Metal Products in 1972 and continued operations at the facility until 1990. Both Dawson and Sundstrand used TCE in the vapor degreasers. A fire occurred at the 221 Sunset Drive facility in July of 1972 due to spontaneous combustion in the vicinity of a vapor degreasing unit. Dawson employees continued manufacturing at this facility following the fire in areas not damaged in the fire. Dawson Metal Products employees that did have their workplace affected by the fire were moved to a 15,000 square foot Building 1 at 1225 U.S. Highway 54, located 0.8 miles southwest from the Sunset Drive facility, for approximately 1 year while fire damages were addressed.

Employees that worked at the Dawson #2 site reported that TCE waste was disposed of on the ground in the loading dock area and in the northeastern portion of the property beyond the parking-lot. Based on the employee reports, there is potentially 17,000 gallons of waste TCE that may have been released. Jack Dickerson, the current owner of the property, acquired it shortly after Dawson #2 vacated in 1973, and has used it for storage in the past. The original building and others added on over time are currently leased to the Laker Fishing Company. Laker Fishing Co. has been in operation at this location since 2002. All buildings on the site are currently used for manufacturing and storage of fishing tackle and equipment. There are approximately 20-30 full time employees working at this facility who work throughout the facility at all times of the day. The site includes an 80,000 ft² manufacturing building that is currently used to assemble and distribute fishing tackle by Laker Fishing Tackle, a subsidiary of Eagle Claw. Access to the southern portion of the site is unrestricted. The northern portion of the site is restricted by a chain linked fence that is locked by the facility manager at the close of each business day.

8.1 Soil Source Area Conclusions

SI sampling documented a source area of TCE contaminated soil, approximately 2,800 square feet in area, in the loading dock area where former employees reported waste disposal. The department collected a total of 23 soil samples from nine borings at depths ranging from zero to 17 feet adjacent to and northeast of the loading dock area on October 3-4, 2017. TCE was detected in 14 of the 23 soil samples ranging at levels from 0.1 to 0.5 mg/kg and noted to be higher in the depths of 10 to 13 feet. Nine soil borings have TCE levels above the EPA screening level, 0.0018 mg/kg, for migration to groundwater.

8.2 Groundwater Conclusions

While a release to groundwater at the site could not be documented during SI sampling, exposure sampling from nearby private wells and a public well did not document any migration of TCE from the site. Seventeen private wells, one public well and two springs located within 1 mile of the site were sampled during the October sampling event. No TCE or other VOCs were detected

in any of the wells or springs sampled. The City of Camdenton is served by three public wells; Blair Heights Well #4, Hickory Well #7, and North Rodeo Well #8. The Dawson Metal Products facility lies on the edge of the Camdenton city limits. Since the site is on the edge of city limits, homes surrounding the site have their water provided by a private well or are part of the Camdenton Public Water Supply.

8.3 Vapor Intrusion Conclusions

During the sampling event conducted on October 2-4, 2017, two outdoor ambient air samples were collected from near the facility. Thirteen indoor air samples including one QC sample were also collected from the warehouse spaces, bathroom, breakroom and other enclosed office spaces. TCE was detected above background ambient air concentrations in samples collected from Rooms 1, 2 and 3, the bathroom and breakroom. The maximum TCE concentration was 2.1 ug/m3 measured in Room 1. This value is below the TCE screening level of 3.0 ug/m3.

Fourteen subslab vapor samples including one QC samples were collected in locations generally paired with the indoor air sample locations. All sample locations are shown in Figure 6 in Appendix A. TCE was detected in samples collected from Rooms 1 and 2. The maximum concentration of 20,000 ug/m3 measured in Room 1 exceeds the action level of 290 ug/m3.

A release of TCE to the unconsolidated material beneath the site has been documented at the site. TCE was not detected in background ambient air near the site, and a building inventory identified no potential indoor sources of TCE. Sampling results document a release of TCE to subslab vapor and indoor air at the site. TCE was detected in paired subslab vapor and indoor air samples, particularly in the southern portion of the building near the former loading dock where TCE was reportedly been dumped. This data suggests that the subsurface intrusion pathway is complete at the site. Further, the presence of cis-1,2-DCE in both the subslab vapor and indoor air is significant because there are no known common indoor sources of this compound. Therefore, its presence in indoor air provides an additional line of evidence for a subslab source rather than something

already inside the building. The data was reviewed by risk assessment staff at the MDHSS, and although one round of sampling documented that the 20-30 employees at the Laker facility were not exposed to levels of TCE in indoor air above health based actions levels, MDHSS staff recommended pre-emptive mitigation to address the potential for future risk from VI should building conditions change.

8.4 Surface Water Conclusions

Surface water was not present on site during the sampling event. The unnamed creek to the north of the site was dry at the time of sampling.

9.0 RECOMMENDATIONS

The department recommends additional site characterization to fully define the areas of TCE contamination from past disposal practices. SI sampling did not fully delineate the loading dock contamination. The additional waste disposal area reportedly at the edge of the parking lot was not evaluated. This information was provided to the department, from a former employee, after the Site Inspection sampling was conducted.

A subsurface depressurization system installed beneath the building by UTC in June 2018 eliminated exposure to the contaminants by building occupants. An Operations and Maintenance (O&M) Plan should be prepared to ensure continued effectiveness of the system. However, source removal should be evaluated during additional site assessment as it would provide a permanent remedy. In cases where waste material is left in place on-site, an Environmental Covenant (EC) in accordance with the Missouri Environmental Covenants Act is necessary to ensure site restrictions and O&M are documented.

11.0 REFERENCES

EPA, 1990 — U.S. Environmental Protection Agency (EPA), Hazard Ranking System, 40 CFR Part 300, Appendix A, 55 FR 51583, December 14, 1990, http://www.epa.gov/superfund/sites/npl/hrsres/#HRS%20Rule.

EPA, 2015 — EPA, Superfund Chemical Data Matrix, December 2015. http://www.epa.gov/superfund/superfund-chemical-data-matrix-scdm.

EPA, 2016 — EPA, Memorandum from Mike Beringer, Environmental Data & Assessment Branch Chief, Region 7, Subject: EPA Region 7 Action Levels for Trichloroethylene in Air, November 2, 2016.

EPA, 2017 — EPA, Vapor Intrusion Screening Level Calculator Version 3.5, June 2017. https://semspub.epa.gov/src/document/11/196702.

ATSDR, 2015 — Agency for Toxic Substances and Disease Registry (ATSDR), Toxicological profile for Trichloroethylene, Draft for Public Comment ending March 15, 2015. https://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=173&tid=30

Bachle, 2017 — Bachle, Peter, Missouri Geological Survey Program Geologist, Memorandum to Amanda Branson and Keith Brown, Hazardous Waste Program Environmental Specialists, Missouri Department of Natural Resources, Subject: Addendum Geohydrologic Summary of the Camdenton TCE Sites, September 8, 2017.

Bachle, 2018 — Bachle, Peter, Missouri Geological Survey Program Geologist, Memorandum to Amanda Branson, Hazardous Waste Program Environmental Specialists, Missouri Department of Natural Resources, Subject: Response to Dawson Metal Products #2 E-mail Dated March 20, 2018, March 29, 2018.

CATM, 2018 — Camdenton Industrial TCE Contamination Advisory Team (CITCAT). CITCAT Meeting Notes, January 9, 2018.

CCAO, 2017 — Camden County Assessor's Office. Property Ownership-Deed Search Results. July 26, 2017.

CSR, 2019 — Missouri Code of State Regulations. Rules of Department of Natural Resources, Division 20- Clean Water Commission. January 29, 2019.

FPO, 2019 — Free Patents Online. Convertible Rail-Highway Vehicle: W.T. Cox Company. http://www.freepatentsonline.com/3701323.html

MDC, 2018 — Missouri Department of Conservation (MDC), Natural Heritage Review Level Three Report: Species Listed Under the Federal Endangered Species Act, March 28, 2018.

MDHSS, 2017 — Missouri Department of Health and Senior Services (MDHSS), Letter from Jeff Wenzel to Valerie Wilder, Dawson Metal Products Camdenton Facility #2 Site, November 8, 2017.

MDNR, 2017a — Missouri Department of Natural Resources (MDNR), Pre-CERCLA Screening Report, Dawson Metal Products Camdenton Facility #2 Site, September 6, 2017.

MDNR, 2017b — MDNR, Abbreviated Preliminary Assessment Report, Dawson Metal Products Camdenton Facility #2 Site, September 8, 2017.

MDNR, 2017c — MDNR. Telephone Record from Jerry Rogers, Former Dawson #2/Sundstrand/Modine Employee and Amanda Branson, Valerie Wilder, Travis Lyon, and Keith Brown, Hazardous Waste Program Environmental Specialists,

Missouri Department of Natural Resources, Dawson Metal Products Camdenton Facility #2, July 21, 2017.

MDNR, 2017d — MDNR. Camdenton Sites: Modine / Mulberry Well / Hulett Lagoon / Dawson Metal Products Camdenton Facility #2 / Camdenton Sludge Disposal Area Site. https://dnr.mo.gov/env/hwp/camdentontce.html. Retrieved March 2018.

MDNR, 2017e — MDNR. 2017 Census of Missouri Public Water Systems. January 31, 2017 https://dnr.mo.gov/env/wpp/docs/2017-census.pdf.

MDNR, 2017f — Missouri Department of Natural Resources, Fact Sheet on the Missouri Environmental Covenants Act, PUB2414, March 2017. https://dnr.mo.gov/pubs/pub2414.htm

MDNR, 2018 — MDNR. Dawson Metal Products Vapor Intrusion Field Form, Dawson Metal Products Camdenton Facility #2, Camden County, Missouri, January 11, 2018.

MGS, 1999 — Missouri Geological Survey, Hydrogeologic Report for the Camdenton Sludge Disposal Area Site, March 30, 1999.

SFLP, 1972 — Springfield Leader and Press, Fires Fumes-Forced Evacuation Praised by Lake Area Workers, July 10, 1972.

SIGNATURES

Prepared by:

Amanda Branson

Amanda Branson
Environmental Specialist
Site Assessment Unit
Environmental Remediation Program

Reviewed by:

Martin Kator
Site Assessment Unit Chief
Site Assessment Unit
Environmental Remediation Program

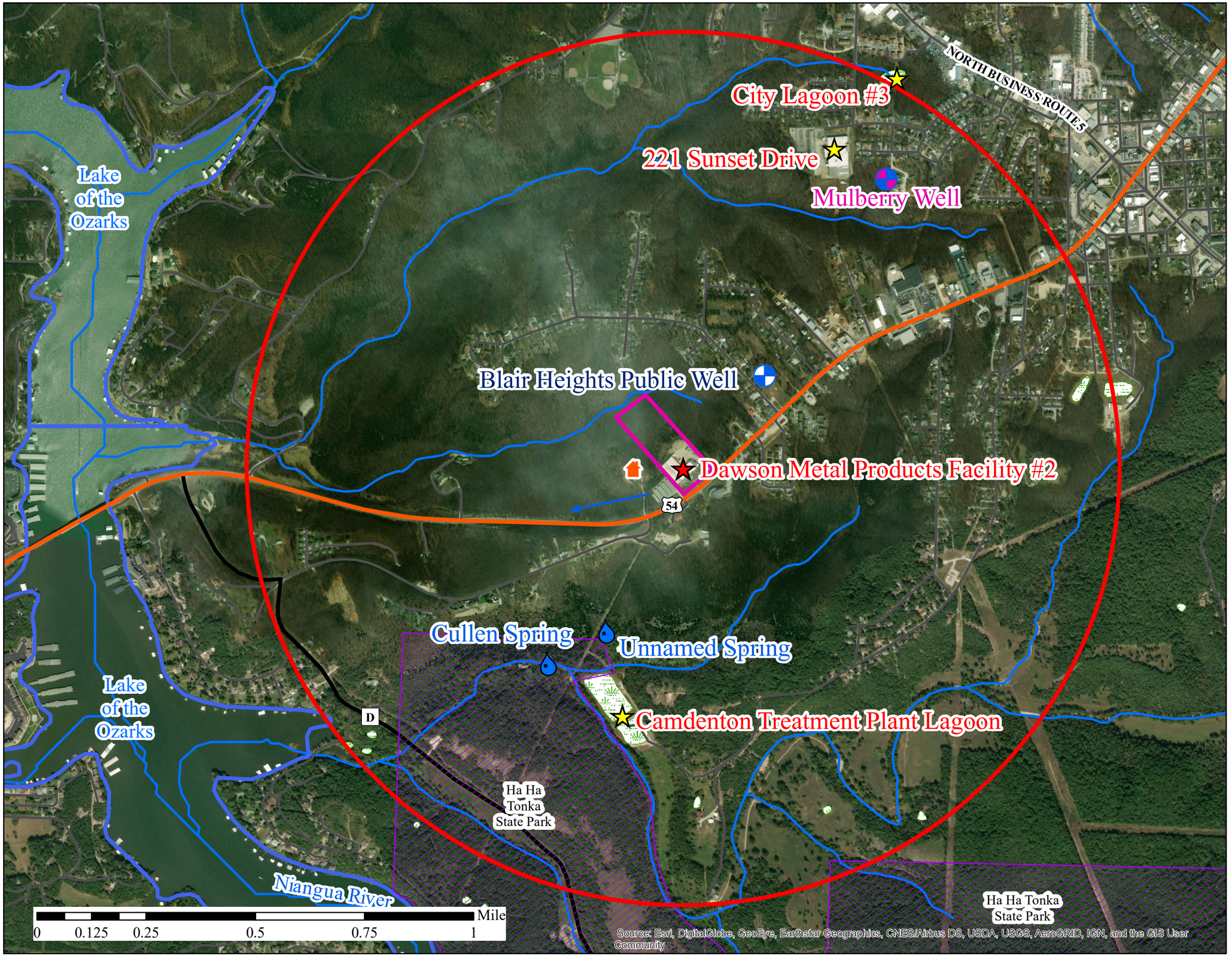
Approved by:

Valerie Wilder
Superfund Section Chief
Environmental Remediation Program

Date: March 11, 2019

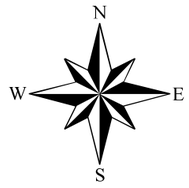
II. FIGURES

Figure 1: Site Location Map
Dawson Metal Products
Camdenton Facility #2 Site
1225 W US Highway 54
Camden County, Missouri



Legend

- Dawson Metal Products Facility #2
- Camdenton TCE Sites
- Nearest Public Well (Blair Heights Well)
- Nearest Private Well
- Mulberry Well (Inactive)
- Spring Sample
- Parcel Boundary
- One Mile Radius
- Lake of the Ozarks
- Ha Ha Tonka State Park
- National Wetland Inventory
- Local Roads
- Federal Highway
- State Highway
- Rivers and Streams
- Surface Water Drainage Route





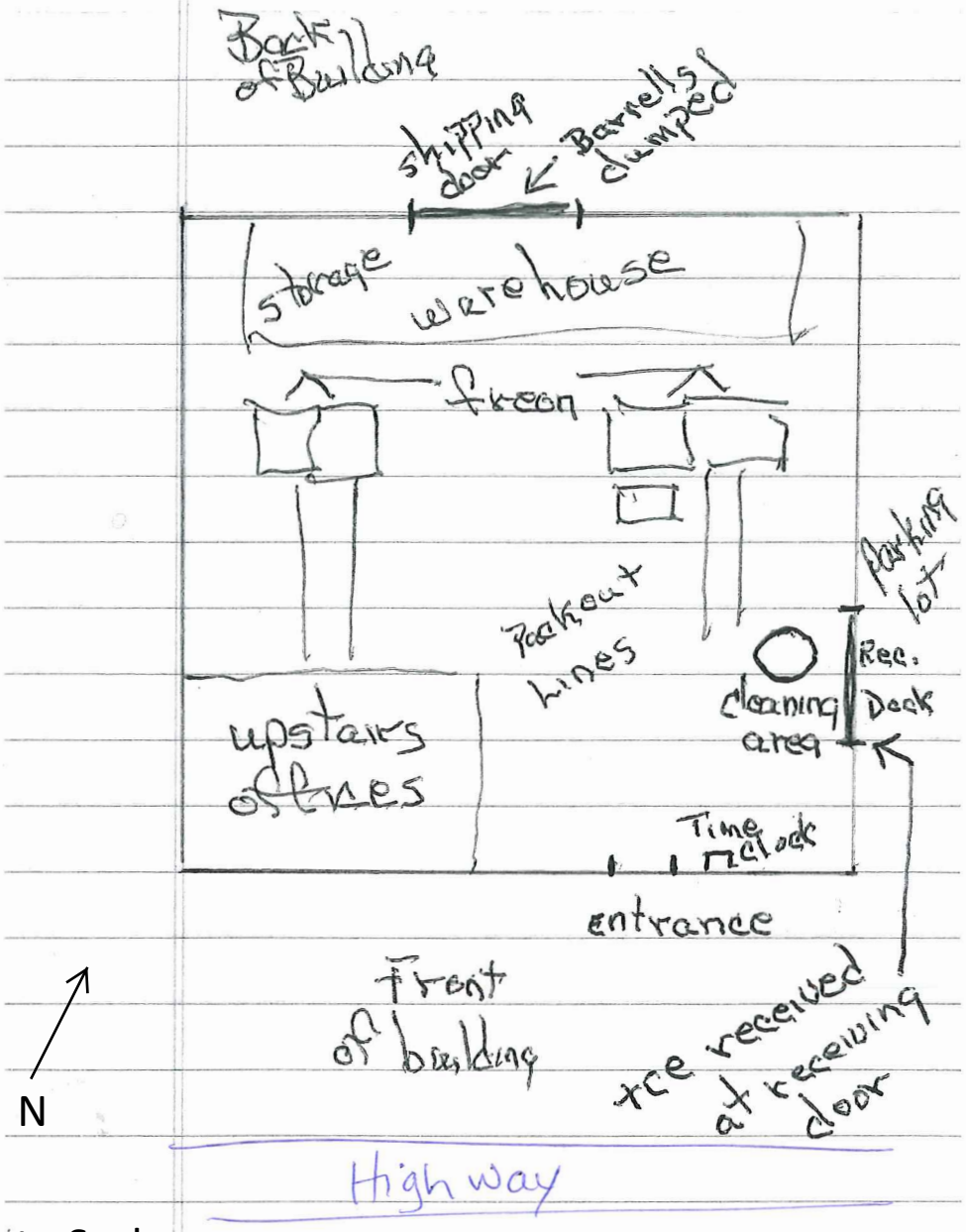
Created on: March 16, 2018 by Amanda Branson. This map is located at
M/Superfund/Dawson Metal Products Camdenton Facility #2/
Fig 1Site_Location_Map.mxd

Base Map: National Agriculture Imagery Program (NAIP) ortho photography. Flight Date: 2014
Data Sources: US Census 2010;
Missouri Department of Transportation

Although data sets used to create this map have been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Figure 2: 1972 Building Layout
Dawson Metal Products Camdenton Facility #2
Camdenton, Mo



Not to Scale

Sketch of building 1 provided to the department by Jerry Rogers during a meeting on August 23, 2017.



Figure 3: 1995 Facility Aerial Photograph
Dawson Metal Products Camdenton Facility #2
Camdenton, Mo

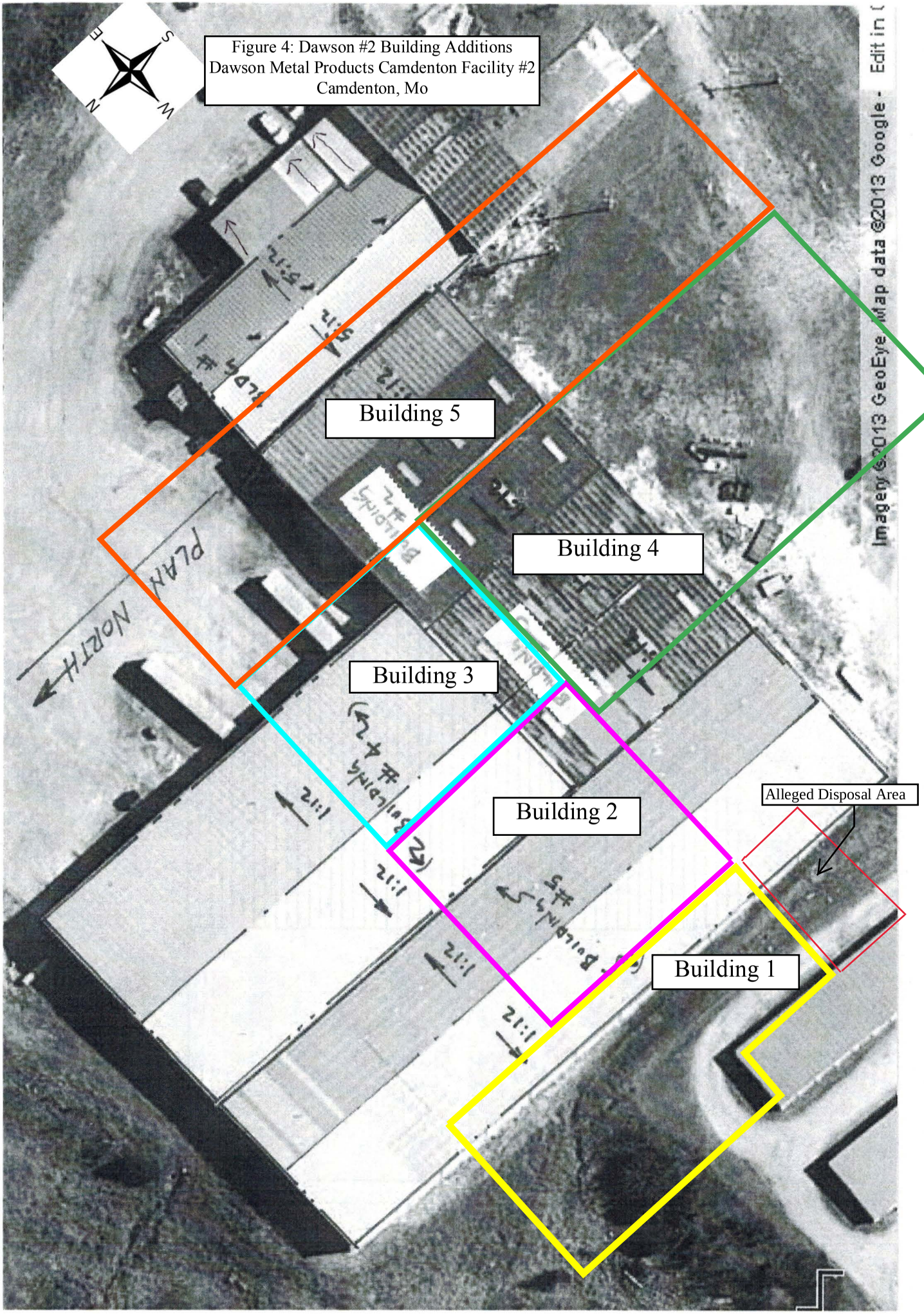
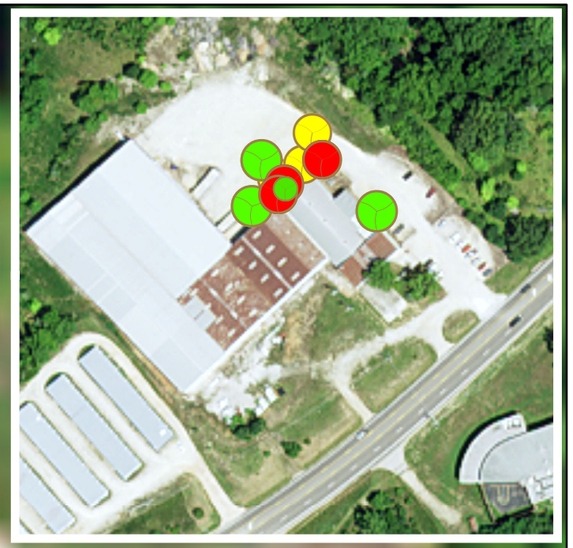

Figure 4: Dawson #2 Building Additions
Dawson Metal Products Camdenton Facility #2
Camdenton, Mo
Building 5
Building 4
Building 3
Building 2
Building 1
Alleged Disposal Area
Imagery ©2013 GeoEye, Map data ©2013 Google -

Figure 5:
Soil Boring Location Map
Dawson Metal Products
Camdenton Facility #2 Site
1225 W US Highway 54
Camden County, Missouri
October 3-4, 2017



SB-09
13.5 - 14.0 ft

SB-05
11.5 - 12.0 ft

SB-08
13.0 - 13.5 ft

SB-07
12.5 - 13.0 ft.

SB-03
8.5 - 9.0 ft

SB-01
6.5 - 7.0 ft

SB-02
12.5 - 13.0 ft

SB-04
16.5 - 17.0 ft

SB-06
11.0 - 11.5 ft

Dawson Metal Products Original Building

0 20 40 80 Feet

Legend

- Sample results are non-detect for TCE
- TCE sample results between 0.05-0.075 ppm
- TCE sample results between 0.1-0.5 ppm

N
W E
S



Created on: November 7, 2017 by Amanda Branson. This map is located at
M/Superfund/Dawson Metal Products Camdenton Facility #2/
Soil_Boring_Location_Map_.mxd

Base Map: National Agriculture Imagery Program (NAIP)
ortho photography. Flight Date: 2014
Missouri Department of Transportation

Although data sets used to create this map have been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

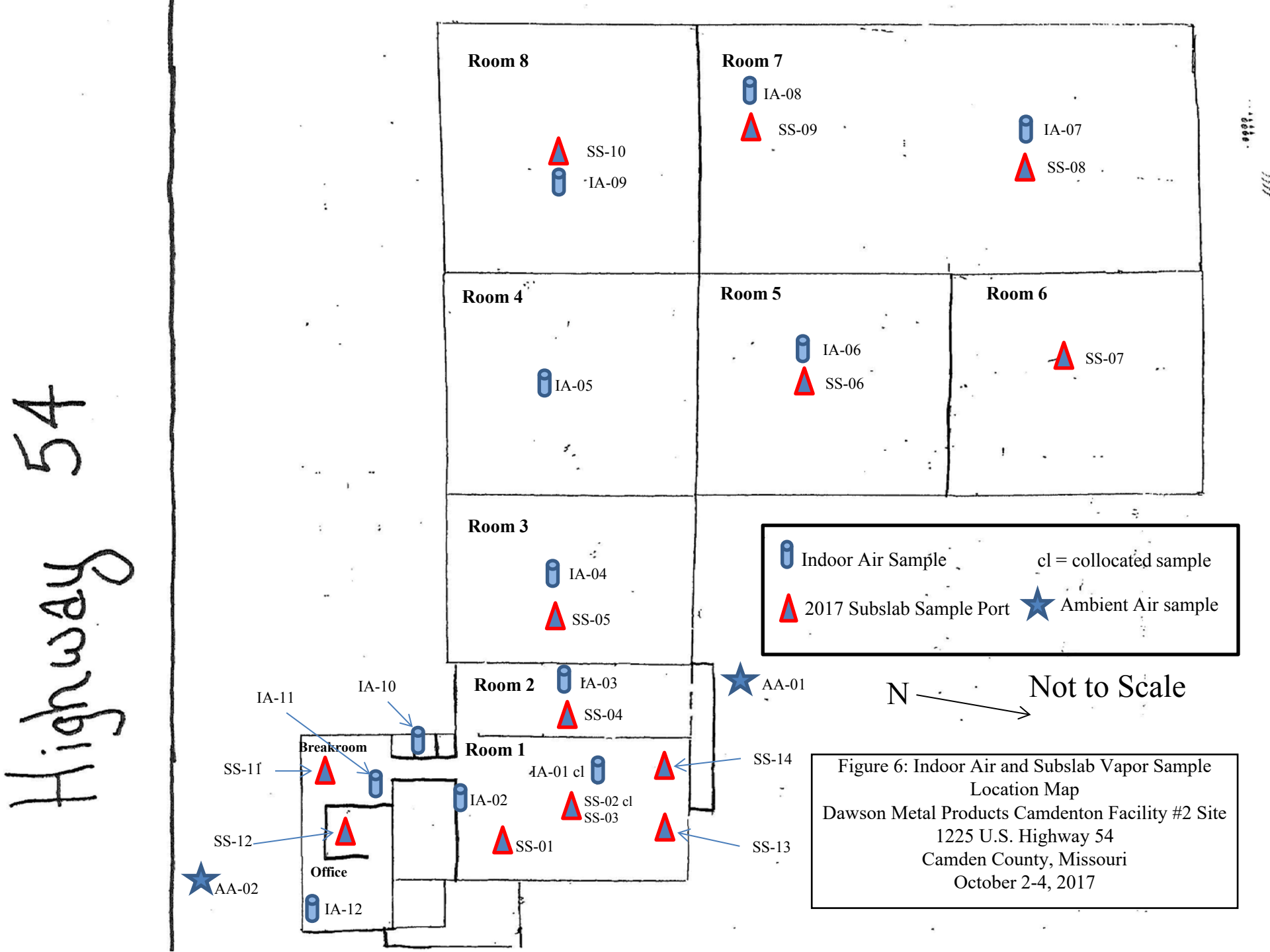
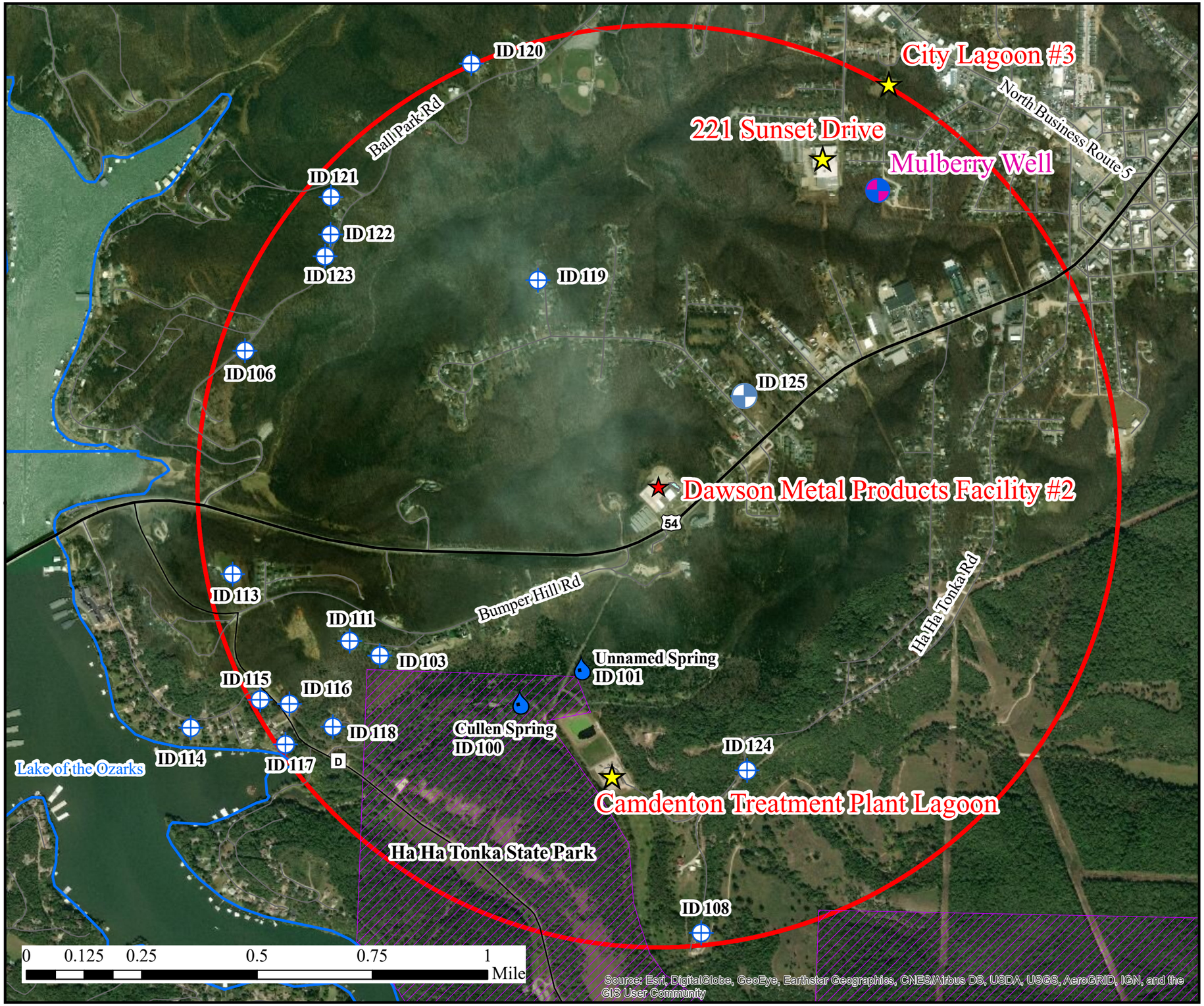


Figure 6: Indoor Air and Subslab Vapor Sample Location Map
Dawson Metal Products Camdenton Facility #2 Site
1225 U.S. Highway 54
Camden County, Missouri
October 2-4, 2017

Figure 7: Well & Spring Sampling Location Map
Dawson Metal Products
Camdenton Facility #2 Site
1225 W US Highway 54
Camden County, Missouri
October 2017



Legend

- Dawson Metal Products Facility #2
- City Lagoon # 3
- 221 Sunset Drive (Modine)
- Camdenton Treatment Plant Lagoon
- Mulberry Well (Inactive)
- Blair Heights Public Well
- Drinking Water Wells Sampled
- Spring Sampled
- 1 Mile Radius
- Lake of the Ozarks
- HaHa Tonka State Park

N



Created on: October 27, 2017 by Amanda Branson. This map is located at M/Superfund/Dawson Metal Products Camdenton Facility #2/October 2017 Groundwater Sample Locations.mxd

Base Map: National Agriculture Imagery Program (NAIP) ortho photography. Flight Date: 2014
Data Sources: US Census 2010; Missouri Department of Transportation

Although data sets used to create this map have been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

III. TABLES

Table 1: Estimated Population Served By Groundwater Within Four Miles of the Dawson Metal Products Camdenton Facility # 2 Site					
Distance (In Miles)	Name of Public Well and Population Served	Total Population Served By Public Wells	Number of Private Wells	Total Population Served by Private Wells[1]	Total Population Served By Groundwater
0-1/4	Blair Heights Well	1240	1	2	1242
>1/4-1/2			4	9	9
>1/2-1	Mulberry Well (INACTIVE)				
	Forest Ridge Subdivision Community Public Well		5	11	11
>1-2	(2) Municipal Wells				
	(10) Non-community Public Wells				
	(14) Community Public Wells	5085	115	269	5354
>2-3	(3) Non-community Public Wells				
	(8) Community Public Wells	845	155	362	1207
>3-4	(2) Municipal Wells				
	(5) Non-community Public Wells				
	(5) Community Public Wells	1394	177	414	1808
TOTAL		**8564**	**457**	**1067**	**9631**

[1] The number of people served per private well was estimated by multiplying the average household size of 2.34 persons per household in Camden County by the number of wells within a distance category (USCB, 2007).

TABLE 2: SELECTED ANALYTICAL RESULTS FOR DRINKING WATER WELLS & SPRING SAMPLES COLLECTED OCTOBER 2-4, 2017
DAWSON METAL PRODUCTS CAMDENTON FACILITY #2, CAMDEN COUNTY, MISSOURI

- All values listed in parts per billion (ug/l) unless otherwise noted.
- NL denotes benchmark value not listed in reference source.
- NA denotes not applicable

Sample Tag Number	173806	173805	173810	173800	173801	173815	173809	173808	173811	173812	173819	173813	173814	173804	173798	173799	173802	173803	173816	173817	173818	173838				
Date Collected	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/02/17	10/04/17				
Location ID Number	100	101	103	106	106 Blind Duplicate	108	111	113	114	115	116	117	118	119	120	121	122	123	124	125 Blair Heights Well	125 Blind Duplicate	126	SCDM[1] MCL	EPA RML[2]	EPA SL[3]	MO WQS[4]
Water Type	Cullen Spring	Unnamed Spring	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Private Well	Public Well	Public Well	Private Well				
Laboratory Number	AD08873	AD08872	AD08876	AD08871	AD08864	AD08882	AD08875	AD08874	AD08877	AD08879	AD08886	AD08880	AD08881	AD08867	AD08869	AD08870	AD08865	AD08866	AD08883	AD08884	AD08885	AD08988				
Water Quality Indicators																										
Dissolved Oxygen (mg/L)	8.55	5.84	NA	4.76	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.87	5.49	6.55	5.73	5.38	NA	NA	NA	NA	NL	NL	NL	NL
Field Temperature (°C)	14.8	18	18.9	17.5	NA	16.9	17.5	17	17.2	17.2	17.6	19	17.7	16.7	15.3	19.1	15.5	16.5	16.9	17.7	NA	15.6	NL	NL	NL	NL
pH	7.01	7.23	7.05	7.17	NA	7.03	6.92	6.96	6.75	6.71	6.73	6.65	6.77	7.16	6.96	7.1	7.11	7.22	6.68	7.13	NA	6.47	NL	NL	NL	NL
Specific Conductivity, umhos/cm	465.7	642	739	527	NA	657	799	951	1388	951	1432	1014	814	560	586	639	703	574	837	659	NA	843	NL	NL	NL	NL
Volatile Organic Compounds (VOCs)[5]																										
Trichloroethene (TCE)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	5	2.6	5	5

[1] SCDM - Superfund Chemical Data Matrix. Maximum Contaminant Level (MCL) for drinking water. January 30. 2014. Risk level 10^{-6}, hazard quotient =1.

[2] EPA RML - Removal Management Level (RML), 2014. Lower of cancer and non-cancer values. Risk level 10^{-4}, hazard quotient=1

[3] EPA SL - EPA Regional Screening Levels (SL) tap water, June 2015. Lowest of carcinogenic and non-carcinogenic value. Risk level 10-6, hazard quotient =1.

[4] MO WQS - Missouri Water Quality Standards (WQS), groundwater/drinking water use catagories, Missouri Code of State Regulations, 10 CSR 20-7.031, January 29, 2014.

[5] All VOCs are non-detect. TCE is listed with its detection limit because it is the primary contaminant of concern.

TABLE 3: SELECTED ANALYTICAL RESULTS FOR INDOOR & AMBIENT AIR SAMPLES COLLECTED OCTOBER 2, 2017
DAWSON METAL PRODUCTS CAMDENTON FACILITY #2, CAMDEN COUNTY, MISSOURI

- All values listed in µg/m3
- Sample results in shaded cells exceed the EPA VISL Screening Level
- Sample results in bold are significantly[1] above AA-01 outdoor air concentrations

Sample Tag Number	173782	173783	173784	173785	173786	173787[6]	173788	173789	173790	173791	173792	173793	173794	173795	173796	EPA VISL[2] Screening Level.	EPA VISL[3] Action Level
Date Collected	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**	**10/02/17**		
Laboratory Number	**AD08989**	**AD08990**	**AD08991**	**AD08992**	**AD08993**	**AD08994**	**AD08995**	**AD08996[4]**	**AD08997[4]**	**AD08998[5]**	**AD08999**	**AD09000**	**AD09001**	**AD09002**	**AD09003**		
Sample ID	**IA-01**	**IA-01**	**IA-02**	**IA-03**	**IA-04**	**IA-05**	**IA-06**	**IA-07**	**IA-08**	**IA-09**	**IA-10**	**IA-11**	**IA-12**	**AA-01**	**AA-02**		
Location of Sample	**Room 1 Co-located on the West End**	**Room 1 Co-located on the West End**	**Room 1 on shelving**	**Room 2 on middle shelf**	**Room 3 on the middle shelf**	**Room 4**	**Room 5 on the middle shelf**	**Room 7 Workstation shelf**	**Room 7 SE corner of room**	**Room 8 Workshelf**	**Unisex Bathroom**	**Breakroom under the TV**	**Front Room Filing Cabinet**	**Outdoor Air Backside of Building**	**Outdoor Air Front of Building in Tree**		
Volatile Organic Compounds (VOCs)																	
Carbon Tetrachloride	0.5	0.52	0.49	0.49	0.5	<0.53	0.51	0.49	0.5	0.45	0.43	0.45	0.38	0.46	0.44	2	20
Chloroform	<0.15	<0.14	<0.18	<0.16	<0.15	<0.42	<0.16	<0.17	<0.16	<0.16	0.19	0.18	<0.18	<0.16	<0.19	0.53	5.3
1,2-Dichloroethane	<0.13	<0.12	<0.15	<0.14	<0.12	**1.4**	0.3	0.28	0.34	**0.4**	<0.15	<0.13	<0.15	<0.13	<0.16	0.47	4.7
Benzene	**1.6**	**1.6**	**1.6**	**1**	0.64	<0.68	0.27	0.3	<0.26	0.48	0.79	**0.88**	**1.8**	0.28	<0.31	1.6	16
Dichlorodifluoromethane	2	2	2	2	2	2	2	1.9	2	2	2	<2.0	2	2	2	440	440
Ethylbenzene	**1.3**	**1.3**	**1.2**	**1.6**	**4.2**	**46**	**12**	**9.6**	**12**	**14**	**0.92**	**1**	**0.98**	0.31	<0.17	4.9	49
m,p-Xylenes	**2.7**	**2.7**	**2.5**	**3.4**	**9.6**	**140**	**29**	**25**	**34**	**35**	**1.9**	**2.1**	**1.9**	0.92	<0.34	440	440
o-Xylene	**1.2**	**1.2**	**1.2**	**1.6**	**4.7**	**71**	**13**	**12**	**16**	**17**	**0.88**	**0.97**	**0.88**	0.39	<0.17	440	440
Toluene	**7.3**	**7.1**	**6.5**	**9.1**	**22**	**30**	**32**	**20**	**20**	**28**	**5**	**5.9**	**5.6**	1.1	0.32	22000	22000
Trichloroethene (TCE)	**2.1**	**2.1**	**1.7**	**0.82**	0.4	<0.46	<0.18	<0.18	<0.18	<0.17	**0.61**	**0.57**	**0.53**	<0.17	<0.21	2*	6
Vinyl Chloride	<0.04	<0.038	<0.048	<0.043	0.047	<0.11	<0.042	<0.043	0.042	**0.17**	<0.048	<0.04	<0.047	<0.041	<0.05	2.8	28

[1] Three times the outdoor air concentration when contaminant is detected in background sample or above the Practical Quantitation Limits (PQL) when the background concentration is < Maximum Detection Level (MDL).

[2] EPA VISL - U.S. EPA Vapor Intrusion Screening Levels (VISL), June 2017. Non-residential use; lower of cancer and non-cancer benchmarks; risk level 10-6, hazard quotient =1.

[3] EPA VISL - U.S. EPA Vapor Intrusion Action Levels, June 2017. Non-residential use; lower of cancer and non-cancer benchmarks; risk level 10-5, hazard quotient =1.

[4] This sample was incorrectly labeled on the laboratory reporting sheet as obtained in Room 6 when the sample was actually obtained in Room 7.

[5] This sample was incorrectly labeled on the laboratory reporting sheet as obtained in Room 7 when the sample was actually obtained in Room 8.

[6] Detection levels were elevated due to sample dilution.

* based on the 2016 EPA Region 7 Action Levels for TCE in Air Memo (USEPA, 2016).

TABLE 4: CALCULATION OF SAMPLE/ COLLOCATED SAMPLE RELATIVE PERCENT DIFFERENCE (RPD) INDOOR AIR SAMPLES DAWSON METAL PRODUCTS CAMDENTON FACILITY #2, CAMDENTON, MISSOURI

All results are in ug/m^3

Sample ID	**IA-01**	**IA-01 CL**	**RPD**
Laboratory Number	**AD08989**	**AD08990**	
Date Collected	**10/2/2017**	**10/2/2017**	
Volatile Organic Compounds (VOCs)			
Benzene	1.60	1.60	0.0
Trichloroethene	2.10	2.10	0.0

TABLE 5: CALCULATION OF SAMPLE/ COLLOCATED SAMPLE
RELATIVE PERCENT DIFFERENCE (RPD)
SUBSURFACE VAPOR SAMPLES
DAWSON METAL PRODUCTS CAMDENTON FACILITY #2, CAMDENTON, MISSOURI

All results are in ug/m^3

Sample ID	**SSV-02**	**SSV-03 cl**	**RPD**
Laboratory Number	**AD09008**	**AD09009**	
Date Collected	**10/4/2017**	**10/4/2017**	
Volatile Organic Compounds (VOCs)			
Benzene	<28	<36	25
cis-1,2-Dichloroethene	<35	<45	25
Tetrahydrofuran	41	40	2
Trichloroethene	11,000	20,000	58

TABLE 6: SELECTED ANALYTICAL RESULTS FOR SUBSLAB VAPOR SAMPLES COLLECTED OCTOBER 4, 2017
DAWSON METAL PRODUCTS CAMDENTON FACILITY #2, CAMDEN COUNTY, MISSOURI

- All values listed in µg/m^3
- NL denotes benchmark value not listed in reference source.
- Sample Results in bold exceed the EPA VISL screening levels
- Sample Results in shaded cells exceed the EPA VISL action levels

Sample Tag Number	173842	173843	173844	173845[3]	173846[3]	173847[3]	173848	173849	173850	173851	173852	173853	173854	173855	EPA VISL Screening Level[1]	EPA VISL Action Level[2]
Date Collected	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**	**10/04/17**		
Laboratory Number	**AD09004**	**AD09005**	**AD09006**	**AD09007**	**AD09008**	**AD09009**	**AD09010**	**AD09011**	**AD09012**	**AD09013**	**AD09014**	**AD09015**	**AD09016**	**AD09017**		
Sample ID	**SS-11**	**SS-12**	**SS-1**	**SS-13**	**SS-2**	**SS-3**	**SS-14**	**SS-4**	**SS-5**	**SS-6**	**SS-7**	**SS-8**	**SS-9**	**SS-10**		
Location of Sample	**Breakroom**	**Copyroom/Office**	**Room 1**	**Room 1**	**Room 1 Co-located**	**Room 1 Co-located**	**Room 1**	**Room 2**	**Room 3**	**Room 5**	**Room 6**	**Room 7**	**Room 7**	**Room 8**		
Volatile Organic Compounds (VOCs)																
1,1,1-Trichloroethane	<6.6	<6.2	<6.4	<61	<48	<61	<6	<6.1	<6	60.0 (d)	<6.2	<6.2	<6.3	<5.8	730,000	730,000
1,2,4-Trimethylbenzene	12.0 (d)	12.0 (d)	15.0 (d)	<55	<43	<55	16.0 (d)	14.0 (d)	15.0 (d)	15.0 (d)	17.0 (d)	22.0 (d)	17.0 (d)	25.0 (d)	8,760	8,760
1,3,5-Trimethylbenzene	<6	<5.6	<5.8	<55	<43	<55	<5.4	<5.5	<5.4	<5.3	<5.6	<5.6	<5.7	6.0 (d)	NL	NL
2, 2, 4-Trimethylpentane	<5.7	<5.3	<5.5	<52	<41	<52	<5.2	<5.2	<5.2	<5	<5.3	6.2 (d)	<5.4	<5	NL	NL
2-Butanone (MEK)	<14	<13	<14	<130	<100	<130	13.0 (d)	<13	13.0 (d)	23.0 (d)	17.0 (d)	18.0 (d)	15.0 (d)	31.0 (d)	730,000	730,000
2-Propanol	14.0 (d)	13.0 (d)	<12	<110	<86	<110	<11	<11	<11	15.0 (d)	13.0 (d)	16.0 (d)	22.0 (d)	16.0 (d)	29,200	29,200
4-Ethyltoluene	11.0 (d)	11.0 (d)	13.0 (d)	<55	<43	<55	14.0 (d)	12.0 (d)	13.0 (d)	13.0 (d)	14.0 (d)	20.0 (d)	15.0 (d)	24.0 (d)	NL	NL
4-Methyl-2-pentanone (MIBK)	<5	<4.6	7.2 (d)	<46	<36	<46	6.6 (d)	4.8 (d)	6.8 (d)	6.6 (d)	6.2 (d)	<4.7	6.3 (d)	<4.4	440,000	440,000
Acetone	69.0 (d)	60.0 (d)	70.0 (d)	<270	<210	<270	80.0 (d)	71.0 (d)	96.0 (d)	150.0 (d)	97.0 (d)	74.0 (d)	110.0 (d)	180.0 (d)	4,500,000	4,500,000
Benzene	<3.9	<3.6	<3.8	<36	<28	<36	<3.5	<3.6	<3.5	<3.4	<3.6	4.2 (d)	<3.7	<3.4	52	520.00
cis-1,2-Dichloroethene	<4.8	<4.5	<4.7	45.0 (d)	<35	<45	<4.4	<4.4	<4.4	<4.3	<4.5	<4.5	<4.6	<4.2	NL	NL
Cyclohexane	<4.2	<3.9	<4.1	<38	<30	<39	<3.8	<3.8	<3.8	<3.7	<3.9	4.2 (d)	<4	<3.7	880,000	880,000
Ethanol	58.0 (d)	100.0 (d)	80.0 (d)	<84	<66	<85	85.0 (d)	54.0 (d)	100.0 (d)	140.0 (d)	110.0 (d)	98.0 (d)	110.0 (d)	130.0 (d)	NL	NL
Ethylbenzene	8.9 (d)	7.3 (d)	12.0 (d)	<49	<38	<49	10.0 (d)	8.0 (d)	10.0 (d)	10.0 (d)	13.0 (d)	10.0 (d)	10.0 (d)	10.0 (d)	160	1600.00
Heptane	<5	<4.6	<4.8	<46	<36	<46	<4.5	<4.6	49.0 (d)	<4.4	<4.7	5.3 (d)	<4.7	<4.4	58,400	58,400
Hexane	<4.3	<4	<4.2	<39	<31	<40	<3.9	<3.9	7.8 (d)	4.0 (d)	<4	<4	<4.1	<3.8	100,000	100,000
m&p-Xylenes	26.0 (d)	23.0 (d)	34.0 (d)	<49	<38	<49	31.0 (d)	24.0 (d)	32.0 (d)	30.0 (d)	35.0 (d)	38.0 (d)	29.0 (d)	39.0 (d)	15,000	15,000
o-Xylene	11.0 (d)	10.0 (d)	14.0 (d)	<49	<38	<49	14.0 (d)	11.0 (d)	15.0 (d)	14.0 (d)	17.0 (d)	15.0 (d)	14.0 (d)	14.0 (d)	15,000	15,000
Styrene	8.7 (d)	7.6 (d)	12.0 (d)	<48	<37	<48	11.0 (d)	9.0 (d)	11.0 (d)	10.0 (d)	11.0 (d)	<4.9	9.9 (d)	<4.5	150,000	150,000
Tetrachloroethene (PCE)	<8.2	<7.7	<8	77.0 (d)	<60	<76	<7.5	<7.6	<7.5	<7.3	<7.7	<7.8	<7.8	<7.2	1600	5800.00
Tetrahydrofuran	32.0 (d)	27.0 (d)	47.0 (d)	36.0 (d)	41.0 (d)	40.0 (d)	42.0 (d)	38.0 (d)	52.0 (d)	53.0 (d)	55.0 (d)	7.1 (d)	52.0 (d)	7.7 (d)	290,000	290,000
Toluene	22.0 (d)	17.0 (d)	30.0 (d)	<42	<33	<42	22.0 (d)	17.0 (d)	25.0 (d)	24.0 (d)	38.0 (d)	40.0 (d)	20.0 (d)	33.0 (d)	730,000	730,000
Trichloroethene (TCE)	<6.5	<6.1	<6.3	**13,000.0 (d)**	**11,000.0 (d)**	**20,000.0 (d)**	**1,000.0 (d)**	8.5 (d)	<5.9	<5.8	<6.1	<6.2	<6.2	<5.7	100	290.00

[1] EPA VISL - U.S. EPA Vapor Intrusion Screening Levels (VISL), June 2017. Non-residential use, lower of cancer and non-cancer benchmarks; risk level 10-6, hazard quotient =1.

[2] EPA VISL - U.S. EPA Vapor Intrusion Action Levels, June 2017. Non-residential use; lower of cancer and non-cancer benchmarks; risk level 10-5, hazard quotient =1.

[3]Detection levels are elevated due to sample dilution.

d - Analyzed by Contract Laboratory

TABLE 7: SELECTED ANALYTICAL RESULTS FOR SOIL SAMPLES COLLECTED OCTOBER, 3-4, 2017
DAWSON METAL PRODUCTS CAMDENTON FACILITY #2 , CAMDEN COUNTY, MISSOURI

- All values listed in parts per million (mg/kg) unless otherwise noted.
- NL denotes benchmark value not listed in reference source.
- ND denotes not detected
- Sample results in shaded cells exceed the Migration to GW levels.
- Sample results in bold are significantly above background levels.[5]

Sample Tag Number	172890	172892	173616	173617	173618	173619	173620	173621	173622	173623	173820	173821	173822	173823	173824	173825	173826	173827	173828	173829	173830	173831	173832		EPA RML[2]		EPA SL[3]		
Date Collected	10/04/17	10/04/17	10/04/17	10/04/17	10/04/17	10/04/17	10/04/17	10/04/17	10/04/17	10/04/17	10/03/17	10/03/17	10/03/17	10/03/17	10/03/17	10/03/17	10/03/17	10/03/17	10/03/17	10/03/17	10/03/17	10/03/17	10/03/17	SCDM[1]	Res.	Ind.	Res.	Ind.	Migrn to GW
Soil Boring Number	SB-07	SB-07	SB-09	SB-09	SB-08	SB-08	SB-07	SB-07 (DUP)	SB-06 Background	SB-06 Background	SB-01	SB-01	SB-01	SB-02	SB-02	SB-02	SB-02	SB-03	SB-03	SB-04	SB-04	SB-05	SB-05						
Depth of Sample, ft	0.5-1.0	5.5-6.0	13.5-14.0	6.0-6.5	10.5-11.0	13.0-13.5	12.5-13.0	12.5-13.0	11.0-11.5	16.5-17.0	11-11.5	6.5-7.0	0.0-0.5	3.0-3.5	9.5-10.1	7.5-8.0	12.5-13.0	6.5-7.0	8.5-9.0	8.0-8.5	16.5-17.0	8.0-8.5	11.5-12.0						
Laboratory Number	AD08979	AD08980	AD08986	AD08985	AD08984	AD08983	AD08981	AD08982	AD08977	AD08978	AD08964	AD08965	AD08966	AD08967	AD08968	AD08969	AD08970	AD08971	AD08972	AD08973	AD08974	AD08975	AD08976						
Volatile Organic Compounds (VOCs)																													
Chloroform	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**0.0558 (f)**	**0.0395 (f)**	<0.005	<0.005	<0.005	**<0.25**	<0.005	0.00516	<0.005	**<0.05**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	20	29	150	0.32	1.4	0.022
cis-1,2-Dichloroethene	0.00713	**>400**	**0.026**	**0.161**	**0.0661**	**0.0984**	0.00976 (f)	<0.005	<0.005	<0.005	<0.005	**<0.25**	**0.0151**	<0.005	**0.154 (f)**	**<0.05**	**0.0128**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	100	160	2000	16	230	0.021
Trichloroethene (TCE)	**>0.400**	**>0.400**	**0.0742**	**0.0202**	**0.0615**	**0.423**	**0.052 (f)**	**0.0171 (f)**	<0.005	<0.005	**0.0246**	**0.378**	**0.0575**	<0.005	**0.0468 (f)**	**<0.05**	**0.108**	<0.005	0.00986	<0.005	<0.005	<0.005	<0.005	8.3	4.4	20	0.41	1.9	0.0018
Vinyl Chloride	<0.005	<0.005	<0.005	0.0207	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	**<0.25**	<0.005	<0.005	<0.005	**<0.05**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.093	6	170	0.059	1.7	0.00069

[1] SCDM - Superfund Chemical Data Matrix, January 30, 2014, lower of cancer and non-cancer values. Risk level 10-6, hazard quotient =1.

[2] EPA RML - Removal Management Level (RML) residential and industrial use, 2014. Lower of cancer and non-cancer values. Risk level 10-4, hazard quotient=1

[3] EPA SL - EPA Regional Screening Levels (SL), June 2015. Residential and industrial use and migration to groundwater (DAF=1). Risk level 10-6, hazard quotient =1.

[4] TCLP - Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit, 40 CFR Part 261, Subpart C.

[5] Three times the background concentration when contaminant is detected in background sample or above the pratical quantitation limit (PQL) when the background concentration is < maximum detection level (MDL).

f - Estimated value, Quality Control (QC) data outside limits

TABLE 8: SELECTED ANALYTICAL RESULTS COMPARISON FOR MOBILE GC VS. LABORATORY RESULTS OF SOIL SAMPLES COLLECTED OCTOBER 3-4, 2017

DAWSON METAL PRODUCTS CAMDENTON FACILITY #2, CAMDEN COUNTY, MISSOURI

				Mobile GC Results		Laboratory Results	
Boring	Sample Tag #	Depth, ft	PID, mg/kg	TCE, ug/kg	cis-2,1 DCE, ug/kg	TCE, ug/kg	cis-2,1 DCE, ug/kg
SB-01	173820	11.0’ – 11.5’	15,000 *	ND	ND	24.6	ND
	173821	6.5’ – 7.0’	15,000 *	6740	ND	378	ND
	173822	0.0’ – 0.5’	49.1	37	ND	57.5	15.1
SB-02	173823	3.0-3.5'	143.8	160	5.9	ND	ND
	173824	9.5-10.0'	0	463	19	46.8	154
	173825	7.5-8.0'	1030	874	63.5	ND	ND
	173826	12.5-13.0'	722	237	10.8	108	12.8
SB-03	173827	6.5-7.0'	41.4	65	3.4	ND	ND
	173828	8.5-9.0'	38.4	38	ND	9.9	ND
SB-04	173829	8.0-8.5'	1.3	ND	ND	ND	ND
	173830	16.5-17.0'	0	ND	ND	ND	ND
SB-05	173831	8.0-8.5	3.4	NA	ND	ND	ND
	173832	11.5-12.0	0	NA	ND	ND	ND
SB-06	173622	11-11.5'	4.5	ND	ND	ND	ND
	173623	16.5-17.0'	0.3	ND	ND	ND	ND
SB-07	173890	0.5-1.0'	125.2	77	ND	640	7.1
	173892	5.5-6.0'	1057	483	158	2350	1790
	173620	12.5-13'	1209	390	37.8	52	9.8
	173621	12.5-13'	1209	313	37.1	17.1	ND
SB-08	173619	13.13.5'	49.2	97	23.6	423	98.4
	173618	10.5-11.0'	44.8	55	25.5	61.5	66.1
SB-09	173617	6.0-6.5'	20	22	12.7	20.2	161
	173616	13.5-14.0'	30	18	7.5	74.2	26

* PID meter does not read higher than 15,000 mg/kg

IV. PHOTOGRAPHIC LOG

Dawson Metal Products
Camdenton Facility #2
Camdenton, Mo

Site Inspection Photographic Log

All Photos Taken 10/2/17-10/4/17 by

Amanda Branson, DNR/HWP/SF or
Hillary Wakefield, DNR/HWP/SF



Photograph 1: Alan Cortvrient and Caleb Troutt, Environmental Services Program (ESP) staff, use a truck-mounted hydraulic push probe to install soil boring 02.



Photograph 2: Alan Cortvrient and Caleb Troutt, ESP staff, remove the soil core from soil boring 02.



Photograph 3: Alan Cortvrient and Caleb Troutt, ESP staff, use a truck-mounted hydraulic push probe to install soil boring 03.



Photograph 4: Ken Hannon, ESP staff, uses a photoionization detector (PID) to screen soil along the length of soil boring 03 core for total VOC concentration.



Photograph 5: Soil Boring 01 core 4.0-5.0 feet



Photograph 6: Soil Boring 01 core 8.0-10.0 feet



Photograph 7: Soil Boring 01 core 11.0-12.5 feet



Photograph 8: Caleb Troutt ESP staff collect a water sample from the unnamed spring at Location ID 100.



Photograph 9: Location of the water sample collected from Cullen spring at Location ID 101.



Photograph 10: Ambient Air (AA) Sample 02 collected at the front of the Dawson Metal Products Facility.



Photograph 11: Indoor Air (IA) Sample 01 collect in the southwestern portion of room 1.



Photograph 12: IA Sample 03 collected on a shelf in the middle area of room 2.



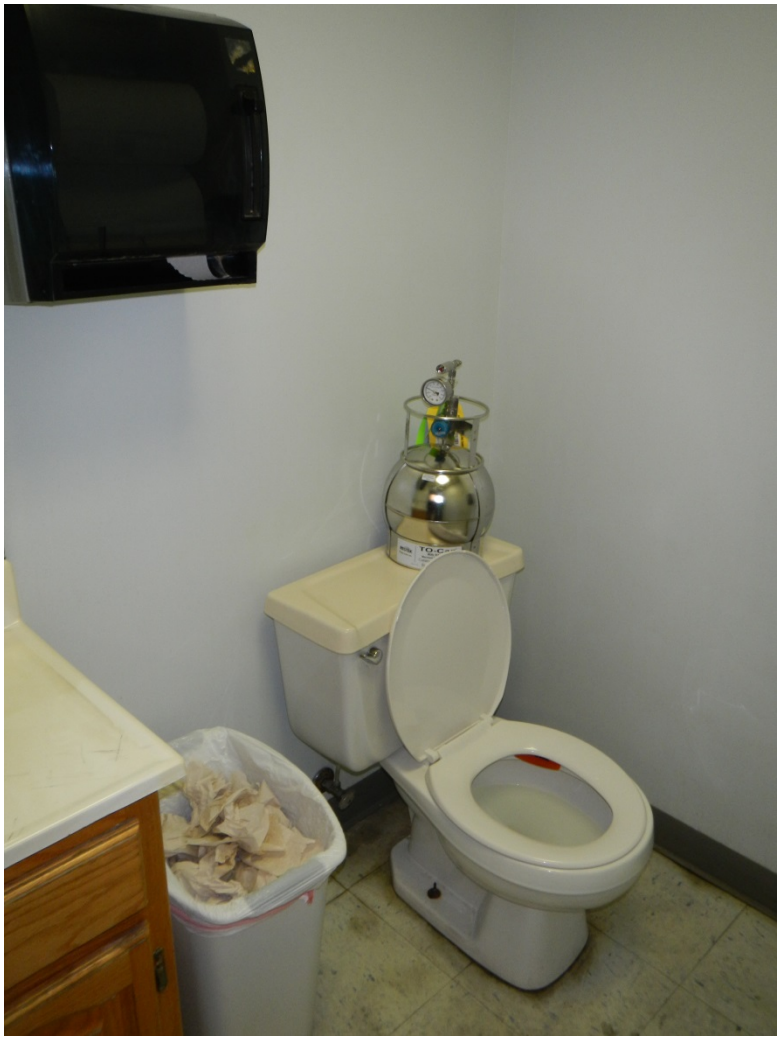
Photograph 13: IA Sample 06 collected in the center of room 5.



Photograph 14: IA Sample 07 (location of the collocated sample) collected at the workstation in room 7.



Photograph 15: IA Sample 09 collected in room 8.



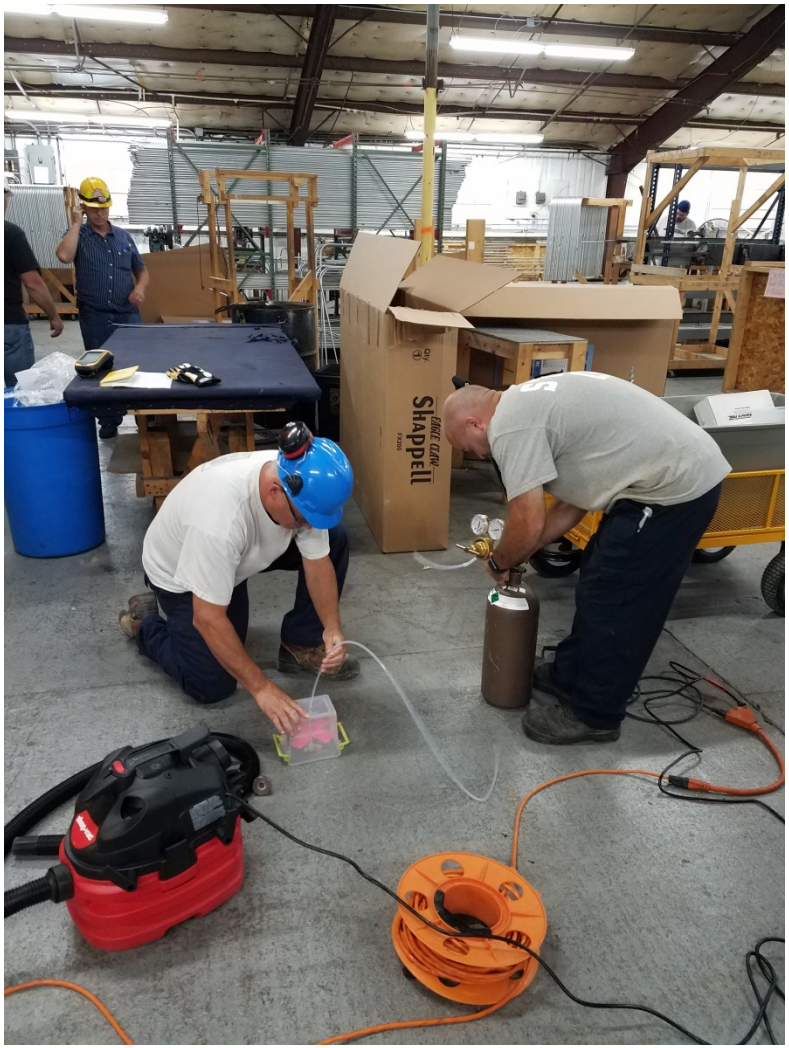
Photograph 16: IA Sample 10 collected in the unisex bathroom in the facility.



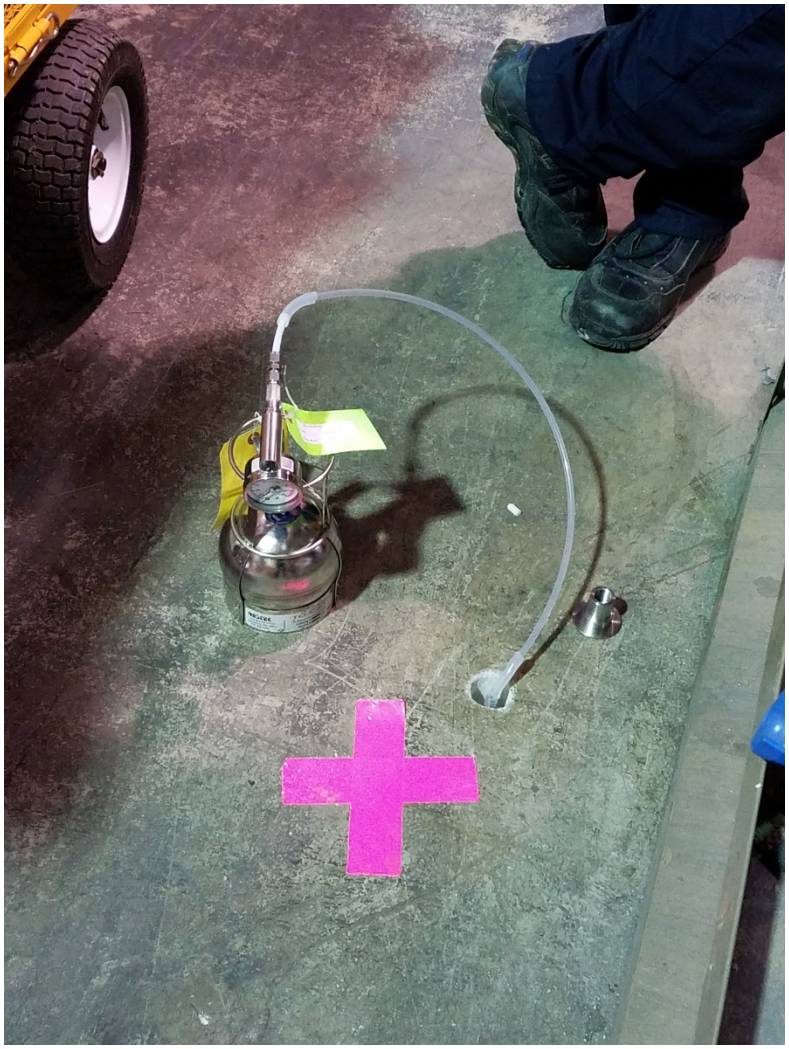
Photograph 17: IA Sample 12 collected in the main office area of the facility.



Photograph 18: ESP staff install the subslab port for Subslab (SS) Sample 02/03 (collocated sample) in room 1.



Photograph 19: ESP staff test the SS 01 port for leaks in room 1.



Photograph 20: ESP staff collect SS Sample 10 from room 8.



Photograph 21: ESP install the subslab port for SS Sample 04 in room 2.



Photograph 22: Ken Hannon, ESP staff, monitors specific conductivity, pH, and temperature during the purging of location ID 117 water sample point.



Photograph 23: Location ID 122 water sample source.

V. SAMPLING DOCUMENTATION

Site Inspection (SI)
Sampling and Analysis Plan
Dawson Metal Products Camdenton #2 Site, Camden County, Missouri

Prepared By:

Missouri Department of Natural Resources
Division of Environmental Quality
Hazardous Waste and Environmental Services Programs

Table of Contents

1.0 Introduction 1

2.0 Site Information 1

2.1 Location and Operations 1

2.2 Previous Investigation 2

2.2.1 Pre-CERCLA Site Screening 2

2.2.2 Abbreviated Preliminary Assessment 3

3.0 Data Quality Objectives 3

3.1 Problem Statement 3

3.2 Planning Team 4

3.3 Conceptual Site Model 4

3.3.1 Contaminant Release 4

3.3.2 Subsurface Properties 5

3.3.2.1 Soil and Residuum 5

3.3.2.2 Bedrock 6

3.3.3 Hydrogeology 8

3.3.4 Surface Water 9

3.3.5 Exposure Pathways 10

3.4 Study Questions 11

3.5 Inputs to Study Questions 11

3.6 Study Boundary 13

3.7 Decision Rules 13

3.8 Tolerable Limits on Decision Error 14

3.9 Sampling Design 15

4.0 Field Activities 16

4.1 Sample Collection 16

4.1.1 Private Drinking Water Well Sampling 16

4.1.2 Soil Sampling 17

4.1.3 Shallow Groundwater Sampling 18
4.1.4 Subslab Vapor Sampling 19
4.1.5 Indoor and Outdoor Air Sampling 21
4.1.6 Surface Water Sampling 22
4.2 Sample Nomenclature 22
4.3 Sampling Order 22
4.4 Sample Analysis 23
4.4.1 Mobile GC Analysis 23
4.4.2 Laboratory Analysis 24
4.5 Number of Samples, Containers and Preservation 24
4.6 Chain-of-Custody 26
5.0 Quality Control (QC) 26
5.1 Field Decontamination 27
5.2 Field GC QC 27
5.3 Quality Assurance/Quality Control (QA/QC) Samples 28
5.3.1 Duplicate Samples 28
5.3.2 Trip Blank 28
5.3.3 Rinsate Blank 28
5.3.4 Ambient Air Samples 29
5.3.5 Collocated Samples 29
5.3.6 Laboratory QC 29
6.0 Investigation Derived Wastes (IDW) Plan 29
7.0 Site Safety 30
8.0 Reporting 30

Tables

Table 1. Stratigraphic Column for the Camdenton Area 7

Table 2. Vapor Intrusion Investigation Screening and Action Levels, Non-Residential 12

Table 3. Private Well Water Screening and Action Levels 13

Table 4. Private Drinking Water Wells and Springs Identified For Sampling 16

Table 5. Minimum Sensitivity Requirements for Lab Analysis 24

Table 6. Estimated Number of Samples and Analytical Methods 25

Table 7. Sample Containers, Preservation & Holding Times 26

Appendix A – Figures

1. Site Location Map

2. Street View of 1225 West Highway 54

3-6. Aerial Photographs of 1225 West Highway 54: 1995, 2014, 2015 and 2016

7. 1225 West Highway 54 Building Layout, 1972

8. Photograph of Loading Dock

9. Plan View of Modine Manufacturing Facility Transects

10-12. Geologic Cross Sections, Modine Manufacturing Facility

13. Photograph of Standing Water, Southwest Corner of Building

Appendix B - Health and Safety Plan

Appendix C – Field Sheets and Chain of Custody Forms

Vapor Intrusion Field Form

Sample Log Form

Photo Log Form

Mobile GC Sample Analysis Log Form

Chain of Custody Form

1.0 Introduction

As authorized under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986, the Missouri Department of Natural Resources (Department), Hazardous Waste Program (HWP), Site Assessment Unit (SAU) is conducting a Site Inspection (SI) at the Dawson Metal Products Camdenton #2 site (Dawson). The Dawson site is the location of a manufacturing facility in Camdenton Missouri where a suspected release of trichloroethene (TCE) occurred in 1972.

The objective of this investigation is to assess potential threats to human health and the environment at the site and to gather data necessary for the preparation of a preliminary site score under the Hazard Ranking System (HRS). The investigation will include the collection of soil, shallow groundwater, private well samples, surface water, indoor air, subslab vapor, and outdoor air to identify potential TCE source areas, and assess threats to human health through the relevant exposure pathways.

2.0 Site Information

2.1 Location and Operations

The center of the Dawson site is an 80,000 ft^2 manufacturing building located on an 11-acre parcel at 1225 West U.S. Highway 54, latitude 37.998918, longitude -92.763290. The parcel is located 1 mile southwest of the Camdenton city center and 1 mile northeast of the Niangua arm on the western portion of the Lake of the Ozarks. Figure 1 is a one mile radius map showing the site location. Figure 2 in Appendix A provides a street view of the parcel from Highway 54. The site is located in a mixed suburban/rural land use area between Camdenton and the lake. Access to the site is not restricted. The nearest residential property is located approximately 250

feet west of the buildings. Figure 3 in Appendix A provides an aerial photograph view of the site from 1995. The superimposed yellow polygon in Figure 3 shows the building structures that were present in 1972 based on former employee statements. Figures 4, 5 and 6 show changes to the site as additional structures were added to the parcel over time.

Use of the property prior to 1972 is not known, but at that time a 15,000 ft^2 building was present. For approximately 1 year beginning in 1972, it has been alleged that the Dawson Metal Products company used the building as a temporary manufacturing facility while repairs were made following a fire at their 221 Sunset Drive facility. Former Dawson employees have alleged that waste TCE was disposed of at the site by discharging it to the ground surface off a loading dock. The current owner of the property acquired it shortly after Dawson vacated, and has used it for storage in the past. The original building and others added on over time are currently leased to the Eagle Claw Fishing Tackle Company. The buildings are used for assembly and distribution of fishing tackle by Laker Fishing Tackle, a subsidiary of Eagle Claw.

2.2 Previous Investigation

The Dawson site is one of several sites in the Camdenton area with known or suspected releases of TCE. These include the Camdenton Sludge Disposal Area, Hulett Lagoon, Modine Manufacturing Co., and Mulberry well. MoDNR is involved in various phases of investigation and cleanup at these other sites.

2.2.1 Pre-CERCLA Site Screening

A Pre-CERCLA Site Screening (SS) was completed for the Dawson site on September 6, 2017 (MDNR, 2017a). The scope of the SS was limited to reviewing existing data, conducting interviews and a site reconnaissance visit on August 23, 2017. The SS report concluded that there was evidence for a potential release of TCE at the site and recommended conducting a CERCLA Abbreviated Preliminary Assessment.

2.2.2 Abbreviated Preliminary Assessment

An Abbreviated Preliminary Assessment (APA) was completed on September 8, 2017 (MDNR, 2017b). The APA was limited to reviewing existing data, further evaluating the likelihood of release and identifying potential exposure routes of concern. The APA report concluded that there was a significant likelihood of a past release of TCE at the site and identified the subsurface/vapor intrusion and groundwater/drinking water pathways as exposure routes of concern. A CERCLA Site Investigation was recommended to determine whether there was a release and assess these exposure pathways.

3.0 Data Quality Objectives

To help ensure precise, accurate, representative, complete, and comparable data, all field work and analyses will be conducted in accordance with the Quality Assurance Project Plan (QAPP) for Pre-Remedial/Pre-Removal and Targeted Brownfields Site Assessments Revision 7, December 7, 2012, and ongoing (MDNR, 2012). The QAPP describes the general data quality objectives (DQO) for site assessment investigations conducted by the HWP and ESP. Those DQOs specific to this project are described below.

3.1 Problem Statement

Based on information provided to MoDNR, it is possible that a substantial mass of waste TCE was released directly to the ground surface at the site over a period of approximately 1 year beginning in 1972. The site is underlain by an unconfined aquifer which is used as a drinking water source for the city of Camdenton, and there may be some private drinking water wells still in use in the area. Buildings on the site are currently used for manufacturing and there are approximately 21 full time employees. There are concerns about the potential impacts to nearby drinking private water wells and exposure of building occupants to TCE through the

subsurface/vapor intrusion pathway. Excavation in the area for utility work or construction could also potentially expose workers to unsafe levels of solvent vapors and contaminated soil in the vicinity of the release.

3.2 Planning Team

The planning team includes staff from the HWP Superfund Section, EPA Region 7, ESP Field Services and Chemical Analysis Sections, the Department of Health and Senior Services and the Missouri Geological Survey.

3.3 Conceptual Site Model

3.3.1 Contaminant Release

Following up on a referral by US EPA Region 7, MoDNR staff contacted a former Dawson employee who worked at the 221 Sunset Drive facility. The employee claimed that following a fire at the facility in 1972, some operations were temporarily moved from 221 Sunset Drive to a building located at 1225 West US Highway 54 (MDNR, 2017a). No other documentation has been identified to establish that Dawson operated temporarily at the Highway 54 location. A July 10, 1972 article in the Springfield Leader and Press describes a large chemical fire that occurred the night before at the Dawson Metal Products Company, 221 Sunset Drive (SLP, 1972). The article states that the fire originated at the TCE vapor degreasing unit inside the factory, and that over 500 residents were evacuated over concerns of inhalation of toxic fumes.

The former employee alleged that used TCE was disposed of daily by pouring it directly onto the ground surface off a loading dock at the 1225 West US Highway 54 location, and that this occurred for approximately one year beginning in the summer of 1972 ending when these operations returned to the Sunset Drive facility. The employee provided a hand-drawn floor

layout of the operation conducted at the Highway 54 location showing the loading dock where waste TCE was allegedly dumped (Figure 6, Appendix A). Figure 7 in Appendix A shows the loading dock referenced by the former employee. These allegations have been corroborated by two other former employees (MDNR, 2017a). Based on estimates by the former employees, including one who claimed to have been personally involved in the disposal, it is possible that over 17, 000 gallons of used TCE may have been released at the site (MDNR, 2017a). The contaminants of concern for the site include TCE and degradation byproducts 1,1-dichloroethene, cis- and trans-dichloroethene, and vinyl chloride. TCE is a known human carcinogen and short-term exposure can potentially affect the developing fetus (ATSDR, 2014).

3.3.2 Subsurface Properties

Subsurface property information is taken from the MGS Geohydrologic Summary and Addendum Reports for the nearby Hulett Lagoon and Camdenton Sludge Disposal sites (Elfrink, 1999 & Bachle, 2017). Since no site-specific subsurface data is available, this information was supplemented with information from site characterization and monitoring reports related to the nearby former Dawson facility at 221 Sunset Drive, also known as the Modine Manufacturing Co. site (Carr, 2009 & CH2M, 2017). Table 1 provides a stratigraphic summary of the subsurface in the vicinity of the site. Figures 9-12 in Appendix 1 provide geologic cross sections based on data collected at the 221 Sunset Drive site.

3.3.2.1 Soil and Residuum

Grading and filling was likely done at the site prior to construction of the buildings, which has occurred in phases over time. The depth and composition of these fill materials is unknown. The first native material beneath the fill is Roubidoux Formation residuum, the upper portion of which consists of silty sandy red clay with chert fragments. The lower portion of the residuum contains relict sandstone, chert beds, and residual clay from deep weathering of the Roubidoux Formation. The predominant soil type is expected to be clay. The thickness of the soil/residuum at the site is not known, but expected to be between 5 and 40 feet. Waste TCE released to the

surface would be expected to move vertically relatively rapidly through more permeable layers of silt, sand and chert fragments, possibly spreading out horizontally along less permeable clay lenses before again finding more permeable material allowing further vertical penetration. Depending on the mass of TCE released, free phase liquid may have reached the bedrock surface. Due to the age of the TCE release (45 years ago), depending on the specific subsurface characteristics at the site, it is possible that the bulk of the solvent has migrated vertically into the bedrock formation, leaving little residual in the overburden materials.

3.3.2.2 Bedrock

The uppermost bedrock is the Roubidoux Formation which consists of dolomite and sandstone. Due to extensive weathering, the Roubidoux surface is expected to be uneven and only isolated erosional remnants may exist beneath the site. The first competent bedrock beneath the site is the 300- feet thick Gasconade Dolomite. The 20-feet thick Gunter Sandstone member forms the bottom of the Gasconade, which is underlain sequentially by the Eminence Dolomite, the Potosi Dolomite, and the Derby-Doerun Dolomite. The Eminence Dolomite is differentiated from the underlying Potosi Dolomite by the lack of druse. A druse is a rock cavity encrusted with finely crystalline quartz. The druse-rich Potosi Dolomite is the most permeable geologic unit within the Ozark Aquifer and generally has an extensive network of karstic channels. Beneath the Derby-Doerun is the Davis Shale Formation. The entire Cambrian section is estimated to be more than 1,150 feet thick. There are no known confining layers between the ground surface and the Davis Shale. Significant karst features are present throughout the region. The bedrock has substantial secondary porosity development, several local streams are classified as losing stream segments, springs and caves are present in the area, and 10- to 65-foot voids have been encountered in local wells.

Table 1. Stratigraphic Column for the Camdenton Area

System	Aquifer Group	Approximate Site – Specific Thickness (ft)	Formation	Hydraulic Conductivity (cm/sec)	Regional Thickness (ft)	Dominant Lithology	Water-bearing Character
Quaternary		10	Colluvium and residuum		0-90	Regolith of residual clay, sand, chert pebbles and cobbles	May contain small amounts of perched water.
Ordovician	Ozark Aquifer	50	Roubidoux Formation	10^{-3}	0-90	Clayey residuum, sandstone and sandy dolomite	Not present in sufficient thickness in the Camdenton area to produce usable quantities of water.
		280	Gasconade Dolomite	10^{-6}	300-385	Cherty dolomite, minor sandstone, and shale	Yields moderate to large quantities of water to wells. Yields range from 20 to 75 gpm. Less-permeable Upper Gasconade may act as a leaky confining unit.
		25	Gunter Sandstone Member	10^{-4}	10-45	Sandstone	Contributes moderate to large quantities of water. Most wells open to other formations.
Cambrian		550?	Eminence Dolomite	10^{-5}	240-635	Cherty dolomite	Yields 6-100 gpm, the average being about 20 gpm
		50?	Potosi Dolomite	10^{-4}	30-330	Dolomite; contains abundant quartz druse	Yields large quantities of water to wells. Yields range from 100 to 750 gpm.
	St. Francois Confining Unit	80	Derby-Doerun Dolomite	10^{-7}	80?-215	Shaley dolomites and shale	Reliable aquitard.
		80	Davis Formation	10^{-7}	50-380?		
	St. Francois Aquifer	90	Bonneterre Formation	10^{-5}	85-200	Dolomite and limestone	Generally used only in outcrop areas. May contribute additional 100-200 gpm to wells open to other formations.
		300	Lamotte Sandstone	10^{-5}	140-300	Sandstone and arkosic conglomerate	
Precambrian	Basement Confining Unit					Igneous and metamorphic rocks	Does not yield water to wells in this area

TCE released in sufficient mass to reach the bedrock surface would be expected to migrate vertically and horizontally through secondary porosity features, over time diffusing into the rock matrix.

3.3.3 Hydrogeology

The formations above the Davis Shale form the Ozark Aquifer. The Gunter Sandstone is generally highly porous and permeable and is an important source of domestic groundwater supplies in the area. Because the Gunter Sandstone generally yields adequate domestic water supplies, few private wells in the area penetrate to the underlying Cambrian Formations. However, municipal wells in the Lake of the Ozarks area are generally cased through the Gunter Sandstone, in order to avoid possible bacterial contamination.

According to drinking water well data, the water table within the Ozark Aquifer near the Dawson site lies close to the same elevation as the Lake of the Ozarks, that being between 660 to 675 feet above mean sea level (amsl). This puts the depth to groundwater for the Dawson site at 285 to 300 feet below ground surface (bgs). Since the primary site contaminants are chlorinated solvents, any wells that draw water from near the site are potential receptors. A dissolved TCE plume has been detected in the Mulberry Street public well which has a 400-foot-deep casing, a total depth of 900 feet. The Mulberry City Well (which is now pumped to waste as a hydraulic control to protect other city wells) produced approximately three times the volume of the other two city wells, suggesting the aquifer is highly heterogeneous. The Mulberry Well probably intercepted more solution-enlarged cavities than the other city wells.

TCE released at the Dawson site may extend farther by entering cave streams, take preferential pathways and miss proximal wells, disperse laterally along more competent bedrock bedding planes, or get drawn toward high yield wells. Adding to the lateral complexity of the subsurface is the possible existence of domestic wells at now-non-existent residences. An engineering

drawing of the Dawson site building from 2003 shows an adjacent residential structure that has since been demolished (Figure 14, Appendix A). Improperly abandoned wells can create preferential downward migration pathways.

Based upon static water level data, there is a steep groundwater gradient toward the Lake of the Ozarks. Therefore, the dissolved phase of the chlorinated solvent plume most likely will migrate toward the lake. Plume migration would generally be toward the west and may impact springs that lie between the sites and the lake. Cullen spring (elevation 700 feet amsl) and an unnamed spring (elevation 740 feet amsl) may be potential receptors.

3.3.4 Surface Water

Surface water leaving the potential source area flows north across the parking lot before descending the steep hill and entering a losing stream segment that drains toward the west. This stream changes to gaining near the lake level, meaning the surface water entering the ground along the losing length of the stream begins to discharge to the surface near the lake.

On August 23, 2017, Geological Survey Program (GSP) personnel were on-site at the Dawson site and observed that surface water had pooled along the southwest side of the building and was flowing into the steep valley located northwest of the building (Figure 13 in Appendix A). It had been several days since the last rain fall, which indicates that the ground near the facility was saturated at the time of the site visit. It is not currently known how persistent, or whether there is, a perched water table beneath the site.

There are no significant perennial streams within 1 mile of the site. Two springs within 1 mile of the site were identified in MoDNR databases, both located approximately 0.5 mile away (Figure 1). Cullen spring lies approximately 0.5 miles southwest of the site along an unnamed

intermittent stream, and discharges at 1.0 cubic feet per second. A second unnamed spring is located approximately 0.5 miles southeast of the site, with an unknown discharge rage. No dye tracing studies have been conducted to identify potential recharge areas for these springs.

3.3.5 Exposure Pathways

Drinking Water

The City of Camdenton, population 4,000, obtains drinking water from three public wells drawing water from the Ozark Aquifer. Two of these wells are located within 1 mile of the Dawson site. MoDNR databases include records for 9 residential water wells within 1 mile of the Dawson site. It is suspected that most of these wells were used prior to the establishment of the public water system, and may not be currently used or may be abandoned. It is possible that other older private wells exist in the area that are not included in MoDNR databases.

Surface Water

Contaminants of concern for this investigation are VOCs from historic releases of chlorinated solvents to the subsurface and are therefore not expected to be present in surface water runoff. Discharge of shallow groundwater from the site to gaining streams or nearby springs could occur, especially during base flow creek conditions, however VOCs would be expected to rapidly partition to the atmosphere. Further, there are no significant perennial streams near the site. The risk of exposure though the surface water pathway is therefore relatively low; however, knowledge about contaminant concentrations in spring discharges could be useful in assessing overall contaminant fate and transport.

Direct Exposure

Excavation of soil for utility work on construction in the site area could result in exposure of workers to solvent vapors or to contaminated groundwater if the contaminants are present in the shallow subsurface at sufficient concentrations.

Subsurface /Vapor Intrusion

The vapor intrusion pathway refers to the migration of volatile chemicals from the subsurface soils and groundwater upwards as vapors, through conduits and preferential pathways and into overlying buildings. The vapor intrusion pathway has been identified as the most immediate potential threat posed by the alleged TCE release, and will be the primary focus of this investigation. The potential receptors to vapor intrusion are workers at buildings located above the TCE contamination.

3.4 Study Questions

The principal study questions are:

- Has there been a release of TCE to the subsurface soil and overburden groundwater at the site?
- Has a release of TCE at the site resulted in threats to building occupants through the subsurface/vapor intrusion pathway?
- Has a release of TCE at the site resulted in threats to nearby residents obtaining drinking water from private wells?
- Has a release of TCE at the site resulted to impacts to surface water discharging from springs in the area?

Note that this investigation is not intended to fully characterize the full extent of soil and groundwater contamination.

3.5 Inputs to Study Questions

The following lists the primary inputs required to address the principal study questions.

- Concentrations of TCE and degradation byproducts in depth-specific soil and groundwater grab samples near the alleged point of release.

- Concentrations of TCE and degradation byproducts in outdoor air, indoor air and subslab vapor samples collected within the study boundaries.
- Concentrations of TCE and degradation byproducts in surface water discharging from springs in the vicinity of the site.
- Concentrations of TCE and degradation byproducts in drinking water wells in the vicinity of the site.
- Various population level, chemical, toxicological and hydrologic input parameters required by the EPA's HRS Quickscore software to calculate a preliminary HRS site score (USEPA, 2016a).
- Health-based screening and action levels for the contaminants of concern (Tables 2 & 3).

Table 2. Vapor Intrusion Investigation Screening and Action Levels, Non-Residential

Compound	Indoor Air and Subslab Vapor				Groundwater ug/l
	Screening Levels[1], ug/m[3]		Action Levels[2], ug/m[3]		
	Indoor Air	SubSlab[3]	Indoor Air	SubSlab[3]	
Trichloroethene (TCE)	3	100	8.8	290	7.4
cis-2,1-Dichloroethene	NA	NA	NA	NA	NA
trans-2,1-Dichloroethene	NA	NA	NA	NA	NA
1,1-Dichloroethene	880	29,000	880	29,000	820
Vinyl chloride	2.8	93	28	930	2.5

[1] Screening levels based on lower of cancer (1E-6) and non-cancer risk (HQ=1). All values obtained from EPA VISL (USEPA, May 2016),

[2] Action levels are based on lower of cancer (1E-5) and non-cancer risk (HQ=1), USEPA VISL, May 2016.

[3] Using an Attenuation Factor of 0.03 (USEPA, VISL may 2016).

Table 3. Private Well Water Screening and Action Levels

Compound	EPA RSL[1], µg/l	EPA MCL[2], µg/l
Trichloroethene (TCE)	0.494	5.0
cis-2,1-Dichloroethene	36.1	70
trans-2,1-Dichloroethene	361	100
1,1-Dichloroethene	285	7.0
Vinyl chloride	0.019	2.0

[1]Screening levels based on lower of cancer (1E-6) and non-cancer risk (HQ=1). All values obtained from EPA Regional Screening Levels (RSLs), accessed September 19, 2017.

[2] EPA National Primary Drinking Water Regulations, Maximum Contaminant Levels for Drinking Water, accessed September 19, 2017.

3.6 Study Boundary

Initial study boundaries will be limited to the property at 1225 West Highway 54 plus the properties identified with private wells and springs near the site. Access for sampling was requested from the owners of the 9 private wells and two owners of parcels with springs. A background private well sampling location east of the site will be selected using available well log data to target similar hydrogeologic units as target wells near the site. Based on the findings of the investigation, the boundaries of the site may be extended to include any other locations where the contaminant release is found to be located.

3.7 Decision Rules

Detection of contaminants of concern in soil or shallow groundwater at the site will document a release under CERCLA. If subslab vapor and/or indoor air contaminant levels exceed the VISLs, further assessment and/or mitigation action will be recommended based on the magnitude of the exceedance. If private well sampling data indicates an exceedance of the EPA maximum

contaminant levels for drinking water, any residents using the well water will be notified immediately and advised to use an alternate source of drinking water until a more permanent response action is undertaken. If a preliminary HRS site score above 28.5 is calculated, the site will considered for preparation of a documentation record and proposed listing on the NPL.

3.8 Tolerable Limits on Decision Error

The hypothesis of this investigation is that TCE and daughter products in the subsurface are posing a health threat to inhabitants of buildings located above the plume through the vapor intrusion pathway and to residents obtaining drinking water from nearby private wells. Falsely rejecting that hypothesis, considered a Type I decision error, would mean mistakenly concluding that the contamination does not pose a health threat. Falsely accepting this hypothesis, considered the Type II decision error, would mean concluding that the contamination poses a health threat when in fact it does not.

The Type I error could result in concluding that no action is necessary to reduce exposure when in fact the contamination is posing a health threat. A Type II error would potentially result in the recommendation for removal or remedial actions at the site which may not actually be necessary to protect public health. The Type I error is considered more severe since it could result in delaying actions needed at the site to protect public health.

Several measures will be taken to reduce the probability of making a Type I decision error. Employing high resolution site characterization (HRSC) techniques will help to protect against making either a Type I or Type II decision error. The use of a multiple lines of evidence approach will further reduce the likelihood of committing either type of decision error. Results will be compared to EPA's vapor intrusion screening and action levels (VISLs) and Maximum Contaminant Levels for drinking water which are established using conservative toxicity and exposure assumptions, further protecting against Type I errors.

3.9 Sampling Design

The SI will employ high resolution site characterization techniques (USEPA, 2015). Soil and groundwater samples will be collected from discreet depths and analyzed for VOCs on-site using a portable GC instrument. Real-time quantitative VOC concentration data will be used to update the conceptual site model and inform the placement of additional borings and discreet depth sampling locations. It should be noted however, that the investigation is not intended to fully characterize the vertical and horizontal extent of the plume. Although a release has not yet been documented at the site, based on the strength of the allegations of dumping and in order to avoid multiple mobilizations, subslab vapor and indoor air sampling will be conducted in the buildings concurrently with the subsurface sampling.

While bulk soil sampling may be useful for identifying source areas with high concentrations of TCE such as where non-aqueous phase liquid (NAPL) is present, its use for assessing the vapor intrusion pathway is not recommended (USEPA, 2015). The analysis methods are not sufficiently sensitive to detect TCE in bulk soil concentrations corresponding to typical VI screening levels, there is potential for low bias due to loss during sample collection and analysis, and there are difficulties characterizing the heterogeneity in TCE concentration distributions in bulk soil using typical small soil sample masses (USEPA, 2014). Due to these considerations, the absence of measurable TCE in bulk soil samples will not be used as an indication that there is a low risk through the vapor intrusion pathway. Bulk soil sampling will be used only to identify areas of high TCE concentration, and assess the potential presence of NAPL.

4.0 Field Activities

4.1 Sample Collection

Sampling activities will include the collection of indoor air, subslab vapor, outdoor air, soil, surface water, shallow groundwater and groundwater samples from existing private drinking water wells.

4.1.1 Private Drinking Water Well Sampling

MoDNR databases identify 9 private drinking water wells within 1 mile of the site (Figure 1). Access will be requested from the owners of these well locations for sampling (Table 4). A door-to-door survey will also be conducted in order to identify other potential residential or industrial wells not included in MoDNR databases.

Table 4. Locations of Private Drinking Water Wells and Springs Identified For Sampling

ID	Well or Spring	Latitude	Longitude	Total Depth (feet)
102	Well	37.998299	-92.773250	305
103	Well	37.993900	-92.774162	290
104	Well	37.997525	-92.760031	231
105	Well	38.000832	-92.755440	395
106	Well	38.00619	-92.776580	360
107	Well	38.008862	-92.778360	160
108	Well	37.988858	-92.760976	325
109	Well	38.002411	-92.781800	230
110	Well	38.002411	-92.781800	320

ID	Well or Spring	Latitude	Longitude	Total Depth (feet)
100	Spring	37.992186	-92.769124	-
101	Spring	37.992815	-92.760185	-

At each well location, samples will be collected from at a point closest to the well head as available. The tap will be opened at a high flow for five minutes. Specific conductivity, pH, and temperature will be monitored during purging. The well will continue to run for an additional three minutes and field measurements will be collected again. If all the parameters are considered stable, (pH within 0.2 units, temperature and specific conductivity within +/- 10%) a sample will be collected. If water quality parameters are not within stable range then the tap will continue to operate for an additional three minutes and this will repeat until stabilization occurs. After purging and prior to sample collection, the flow at the tap should be minimized to reduce agitation and aeration in the sample. The samples will be labeled, recorded on chain of custody forms and stored on ice until submission to the laboratory for analysis. Post-processed latitude and longitude data will be collected at each wellhead location using a Trimble Geoexplorer handheld GPS.

4.1.2 Soil Sampling

Soil coring will be conducted using a truck-mounted hydraulic push probe. At each boring location, 2.125-inch diameter cores will be collected at 4-5 foot intervals from the surface to refusal in acetate sleeves using a macro-core sampler. Soil cores will be field-logged and photographs of each core will be documented on a field form (Appendix A). As quickly as possible after exposing the core, a photoionization detector (PID) will be used to screen soil along the length of the core for total VOC concentration. PID screening will be performed by punching a hole in the macro-core liners at each foot interval and placing the detector screening

port in the void space to measure ionizable VOCs. Soil samples will be collected for analysis using Lock N' Load® 5-gram soil samplers based on the PID results.

Initial soil boing locations will be selected based on allegations of where TCE was released. If TCE is detected near the alleged point of release using field screening methods, additional boing locations may be selected further away to estimate the lateral extent of contamination in the overburden. Note that soil sampling is intended only to identify areas of gross VOC contamination and/or presence of DNAPL, and will not be used to assess potential risks through the vapor intrusion pathway.

4.1.3 Shallow Groundwater Sampling

If encountered during soil boring, overburden (perched) groundwater will be collected for VOC analysis. At a second location a few feet adjacent to the soil boring, a Geoprobe® Screen Point sampler will be driven to refusal, and the drive rods retracted to expose the screen to the bottom 4 feet of the overburden. A water level indicator will be used to determine whether perched groundwater is present and the depth of the water column. If no water is initially measured, the screen point sampler will be left in place for a period of time to allow for recharge. When sufficient water is available, tubing will be inserted through the drive rods into the screen point sampler and a peristaltic pump or tubing check valve will be used to collect samples.

To avoid potential degassing/pressure-change issues related to water moving through the peristaltic pump apparatus, the groundwater samples will be collected prior to contact with the peristaltic pump. An extra length of Teflon tubing (approximately ten feet long) will be connected to the downhole tubing at a location between the well head and the peristaltic pump. Once purging is completed, the extra length of tubing, filled with representative groundwater, will be disconnected from both the downhole tubing and the pump tubing. Water from that

tubing will be gently poured into VOA vials, preserved with hydrochloric acis and stored on ice prior to analysis.

Additional depth-discrete ground water samples will be collected at shallower depths by repositioning the drill rig a few feet away and re-advancing the screen point sampler to a second desired depth interval. Depths will be chosen in the field based on observations, but at minimum should include a sample from near refusal and one from near the estimated top of the saturated overburden (if different). Following sample collection, the boreholes will be plugged with bentonite.

4.1.4 Subslab Vapor Sampling

Subslab vapor samples will be collected from beneath the concrete floor in the building spaces. The number and location of subslab vapor samples will be based on the soil boring findings, building layout, foundation configuration, building use patterns and size. The current manufacturing operation is conducted in approximately 80,000 ft^2 of building space. The original 15,000 ft^2 building shown in Figure 3 was constructed prior to 1972. Based on the aerial photographs shown in Figures 3-6, a 20,000 ft^2 addition appears in the 2014 photo, another 20,000 ft^2 addition in the 2015 photo, and a final 25,000 ft^2 building in the 2016 photo. Based only on the appearance of rooflines in the aerial photographs, there may be at least six separate foundation walls for these buildings.

US EPA guidance does not prescribe a specific sampling density based on building size or other individual site-specific factors, but does indicate that three subslab sampling locations are typical for commercial or residential buildings less than 1,500 ft^2 (USEPA, 2015). The state of New Jersey's 2016 vapor intrusion guidance document includes a table recommending a minimum number of subslab vapor samples based on square footage (NJDEP, 2016). For an 80,000ft^2

building with a single foundation, a minimum of 8 samples are recommended. However, the guidance cautions against basing sampling density on square footage alone. Both the USEPA and New Jersey guidance documents recommend considering additional sampling locations based on the conceptual site model and in instances where portions of buildings are underlain by multiple separate foundation footings.

For this investigation, the number and placement of subslab sampling locations will be determined in the field using a dynamic work plan approach. More locations will be selected in the event that widespread gross subsurface contamination is observed; fewer if less or no contamination is observed. Similarly, more locations will be selected to accommodate additional foundation wall divisions beneath buildings; fewer in buildings with no such divisions. Table 5 provides an estimated range of anticipated subsurface sampling locations based on these considerations. Sampling ports will generally be placed away from outer building perimeter walls or foundation walls, except in cases where there are known subsurface sources near such walls.

At each sampling location, a 5/8" hole will be drilled through the concrete slab and slightly into the subslab base material using a hammer drill. The hole will be recessed inside a larger 1-inch countersunk hole to allow for a flush mount sampling port completion. This will allow for collection of additional subslab vapor samples from the same sampling ports in the future if necessary. A Vapor Pin™ sampling port will be driven into the hole and immediately leak-tested.

Ultra-high purity helium will be introduced into a shroud surrounding the sampling port until a concentration of ≥60% is achieved inside the shroud as measured with a thermal conductivity helium meter. For a 2 minute period, negative pressure will be applied to the sampling port using 1,000 ml/min pump, and subslab vapor will be collected from the subslab space into a

Tedlar™ bag. The vapor collected inside the bag will be tested for helium. A result of ≤1% helium will demonstrate that the sampling port is sufficiently leak-free for active vapor sampling.

Following a successful leak test, disposable tubing will be used to immediately connect the sampling port and a 1L Summa canister. The port will then be allowed to equilibrate for a minimum of 2 hours prior to sample collection. Following equilibration, a subslab vapor sample will be collected into the Summa canister at a rate of 100 ml/min. After 9-10 minutes, the Summa canister valve will be closed and disconnected from the sampling train. The sampling port will be immediately capped and the flush mount hole covered with a locking stainless steel cap.

Following completion of investigation, when it is determined that no additional subslab vapor sampling is necessary, the sampling ports will be removed, and the subslab holes will be patched with epoxy concrete and finished to the original grade to the extent practical.

4.1.5 Indoor and Outdoor Air Sampling

Prior to the collection of indoor air samples, a Vapor Intrusion Field Form will be completed for each building documenting structural and usage features that may influence vapor intrusion, and inventorying any potential indoor sources of vapor (Appendix D). Indoor air sample locations will be chosen in the field based on current use patterns and exposure durations inside the building, the presence of any preferential vapor intrusion pathways from the subsurface. The number of indoor air samples will be determined in the field based on the soil boring findings, building size, layout and usage. Indoor air samples will generally be paired with subslab vapor ports, however, it is anticipated that there may be more subslab vapor ports than indoor air samples due to the layout of the building foundation walls. Air samples will be collected using 6L Summa canisters set to collect an 10-hour time-integrated sample from breathing zone height.

Two outdoor air samples will be collected; one from the northeast side of the building and one from the southwest side, both approximately 50 feet from the building walls and away from building HVAC exhaust sources. Samples will be collected in 6L Summa canisters over a 10-hour period concurrent with indoor air samples.

4.1.6 Surface Water Sampling

Access for sampling will be requested from the owners of the two springs identified within 1 mile of the site (Figure 1). If accessible and present, spring water will be analyzed in the field for pH, specific conductivity, temperature and oxygen reduction potential prior to the collection of water samples for laboratory analysis. Samples will be collected as close to the point of discharge as practical.

4.2 Sample Nomenclature

Groundwater samples collected from private drinking water wells will be named sequentially as collected using the prefix PW (e.g. PW01, PW02). Soil boring locations will be named sequentially as installed (e.g. SB01, SB02). Discrete soil samples collected from soil boring locations will be named using the following format; SBxx-yy', where yy is the depth of the sample in feet below ground surface. Depth-discrete overburden groundwater samples collected from bore holes will be named using the following format; GWxx yy-zz, where yy-zz is the depth interval of the screen point sampler when the sample is collected (e.g. GW01 8-12'). Surface water samples will be named sequentially as collected using the prefix SWxx. Ambient air samples will be named AAxx, indoor air samples IAxx and subslab vapor samples SSVxx sequentially as collected.

4.3 Sampling Order

Indoor/outdoor air, private well and spring sampling will be conducted on the first day of field activity. Soil boring work will be initiated on the second day. Field analytical data obtained

from the subsurface borings will be used to determine the number and placement of subslab vapor ports and indoor air samples inside the building. Following installation and leak-checking, the ports will be installed be allowed to equilibrate a minimum of 2 hours.

4.4 Sample Analysis

Soil and overburden groundwater samples will be analyzed for the contaminants of concern in the field using a mobile gas chromatograph. Soil and groundwater samples submitted to the Department's laboratory for comparison analysis will be analyzed by SW-846 Method 8260b. Drinking water samples submitted to the Department's laboratory for comparison analysis will be analyzed by EPA Drinking Water Method 524.2. Soil samples will also be screened in the field for the presence of dense non-aqueous phase liquids (DNAPLs) using a Sudan IV dye color indicator test kit. Indoor air outdoor air and subslab vapor samples will be submitted to Eurofins laboratory in Folsom CA for analysis of contaminants of concern by EPA Method TO-15/SIM.

4.4.1 Mobile GC Analysis

Soil and groundwater samples will be analyzed for TCE and cis-1,2 DCE using the Frog-4000™ mobile gas chromatograph/PID system manufactured by Defiant Technologies in accordance with the SOP (MDNR-DEQ-HWP-4000).

5-ml groundwater samples will be introduced into a glass sparge tube on the GC using a glass luer lock syringe. If samples are suspected of containing high concentrations, they may be diluted in deionized water prior to analysis. The sample will be sparged with air to transfer VOCs from the sample to an absorbent trap which is then heated to transfer the VOCs into the GC column for separation. Compounds will be detected using a photoionization detector operating at 10.6eV, identified based on retention times and quantitated using the instrument's PC software. Sensitivity for the field GC water analyses will be determined based on the initial 5-point calibration, but is anticipated to be in the range of 5 µg/l per compound. Sample analyses will be recorded on the Sample Run Log Form shown in Appendix B.

5-gram soil samples will be introduced into the glass sparge tube on the GC and 5-mls of deionized water added using a glass luer lock syringe. The water/soil mix is then analyzed as above. If samples are suspected of containing high concentrations, the 5-gram sample will instead be placed in a glass vial with 5ml of methanol, capped and gently agitated for 60 seconds. A 5 µl to100 µl volume of the methanol will be injected into 5-mls of deionized water and analyzed as above.

4.4.2 Laboratory Analysis

Analysis of groundwater samples by EPA SW-846 Method 8260b will be conducted in accordance with the published method and the Department's SOP ESP-CAS-2680. Analysis of air and vapor samples by EPA Method TO-15/SIM will be conducted in accordance with the published method. The minimum sensitivity requirements for samples submitted to the laboratory analysis are provided in Table 5.

Table 5. Minimum Sensitivity Requirements for Lab Analysis

Compound	Indoor & Outdoor Air, ug/m^3	Subslab Vapor, ug/m^3	Groundwater, ug/l	Soil, ug/kg
cis-2,1-Dichloroethene	0.5	10	0.5	5
Trichloroethene (TCE)	0.5	10	0.5	5
1,1-Dichloroethene	0.5	10	0.5	5
trans-1,2-Dichloroethene	0.5	10	0.5	5
Vinyl chloride	0.5	10	0.5	5

4.5 Number of Samples, Containers and Preservation

Table 6 provides a list of the estimated number of samples and analytical methods. Sample containers, preservation and holding times are listed in Table 7. A minimum of four 40 ml vials will be collected from each depth-discrete sampling location: two 40 ml vials for the mobile GC

analysis, and two set aside to potentially submit for laboratory comparison analysis. Samples to be analyzed on-site will not be preserved with acid. Samples collected for possible laboratory analysis will be preserved with HCl. At locations where duplicates are collected, eight vials will be collected. These are minimum sample volumes; additional vials will be collected at each location as practical to allow for vial breakage and re-analysis. All samples will be recorded on the sample log form and stored on ice until analysis.

Table 6. Estimated Number of Samples and Analytical Methods

Matrix	Analytes	Number of Samples
Soil	TCE and cis-1,2-DCE, mobile GC	10
Soil	VOCs, EPA SW-846 Method 8260B Target List	10
Groundwater	TCE and cis-1,2-DCE, mobile GC	10
Groundwater	VOCs, EPA SW-846 Method 8260B Target List	5
Private Well Water	VOCs, EPA SW-846 Method 8260B Target List	5
Surface Water	VOCs, EPA SW-846 Method 8260B Target List	1
Indoor Air	TCE and daughter products, EPA Method TO-15 SIM	7-14
Outdoor Air	TCE and daughter products, EPA Method TO-15 SIM	2
Subslab Vapor	TCE and daughter products, EPA Method TO-15	12-20

Depth-specific soil and groundwater samples will be collected from boreholes for on-site VOC analysis, and approximately half of the samples analyzed on-site will also be submitted to the Department's laboratory for comparison VOC analysis by EPA SW-846 Method 8260b. The number of samples collected will depend on the number of borings advanced and the number of depth-discrete intervals sampled from each boring, and these will be determined in the field. It is estimated that approximately 8 borings will be advanced and 1-2 depth-discrete samples

collected from each boring for a total of 8-16 groundwater and soil samples analyzed on-site and approximately 5 samples of each media submitted for laboratory analysis.

Table 7. Sample Containers, Preservation & Holding Times

Analytes	Matrix	Container(s)/Volume	Preservative(s)	Holding Time
COCs	Water	Two 40ml Amber glass vial with Teflon lined cap.	HCL/store at $<6^0$C	14 days
COCs	Soil	Three 5-gram Lock N' Load® samplers.	store at 0^0C	14 days
COCs	Air	1L and 6L Summa canisters	None	14 days

Water samples collected for on-site VOC analysis will be collected in 40 ml amber glass vials with Teflon-coated lids and, if not analyzed immediately, stored on ice until analysis. Samples for Method 8260b analysis will be collected in the same containers, preserved with hydrochloric acid and stored at $<6^o$C with a maximum holding time of 2 weeks. Soil samples will be collected in 5 gram Lock N' Load® samplers and stored on ice until analysis.

4.6 Chain-of-Custody

Samples collected for on-site VOC analysis will be named using the nomenclature described in Section 4.2 and logged on the field sheet included in Appendix B. All samples selected to be submitted for laboratory analysis will be entered onto an ESP COC form to be relinquished to a sample custodian at the state's Environmental laboratory for analysis in accordance with ESP-CAS-2670.

5.0 Quality Control (QC)

Field Sampling quality control measures described in SOPs ESP_CAS-2090, MDNR-ESP-210 and ESP-ESP-213 will be followed during sample collection as further described below.

5.1 Field Decontamination

Clean disposable latex gloves will be worn by sampling personnel and clean or field decontaminated equipment will be utilized for each sample location to minimize the possibility of cross-contamination. The following procedure will be used to decontaminate Geoprobe boring rods and screen point samplers between sampling locations.

- Brushing with stiff-bristle nylon brush to remove visible soil debris;
- Cleaning with Simple Green® or Liquinox solution detergent and further brushing;
- Rinsing with DI water; or alternatively due to large volume required, the Geoprobe tooling will be rinsed with plain potable water
- Wiping dry with clean paper towels

5.2 Field GC QC

The GC will be calibrated prior to sample analysis using a series of five calibration standards containing TCE and cis-1,2-DCE prepared in methanol. The calibration will cover a concentration range of 5 ug/l to 200 ug/l for each compound in water. A calibration correlation coefficient of 0.95 or better should be achieved for each compound. At the beginning of each day that samples are analyzed a method blank containing deionized water will be run to demonstrate a clean baseline. A method blank may also be run periodically during the day and following analysis of any high concentration samples to demonstrate that the instrument is free of interferences. A calibration check sample containing each compound at 20 ug/l will also be analyzed at the beginning of each day to demonstrate that the calibration is still valid. The relative percent difference between the measured concentration and the true value for each compound in the calibration check sample should be below 20%.

5.3 Quality Assurance/Quality Control (QA/QC) Samples

The following samples will be collected as part of the quality control/quality assurance procedures for the investigation.

5.3.1 Duplicate Samples

Duplicate groundwater samples will be collected at a frequency of 10% of samples collected to assess overall sampling and analysis precision in accordance with the SOP MDNR-ESP-210. Precision will be assessed from the relative percent difference between duplicate sample results and should be below 30%.

5.3.2 Trip Blank

A trip blank will be used to estimate bias due to cross-contamination during sample storage and transport. One set of water trip blanks will be transported to the site and returned for VOC analysis.

5.3.3 Rinsate Blank

An equipment rinsate blank will be collected after decontaminating the screen point groundwater sampler between boring locations. An attempt will be made to collect the rinseate blank following sample collection at a probe location where elevated levels of contaminants of concern were detected. Following decontamination, deionized water will be rinsed over the screen point sampler and into a sample container which will be analyzed for TCE and cis-1,2-DCE by mobile GC.

5.3.4 Ambient Air Samples

Two ambient outdoor air samples will be collected from locations approximately 100 feet west and east of the building. A 10-hr time-integrated sample will be collected from breathing height in a 6L Summa canister for analysis of target compounds by EPA Method TO-15/SIM.

5.3.5 Collocated Samples

At a frequency of 10%, collocated indoor air and subslab vapor samples will be collected. At selected locations, two 6L Summa canisters will be placed next to each other and an 10 hour time-integrated indoor air sample will be collected in each simultaneously. At selected locations, sublab vapor sampling ports will be installed approximately 3 feet apart and sampled simultaneously. An effort will be made to select collocated sampling locations most likely to yield positive results for TCE and related byproducts.

Also at a frequency of 10%, collocated soil boring samples will be collected. For a selected depth interval along a soil core, three Lock N' Load® samplers will be used to collect soil samples adjacent to each other simultaneously. An effort will be made to selected boring intervals most likely to yield positive results for TCE based on PID screening.

5.3.6 Laboratory QC

Laboratory precision and accuracy will be assessed as described in the QAPP for Pre-Remedial/Pre-Removal and Targeted Brownfields Site Assessments Revision 7, December 7, 2012 and ongoing.

6.0 Investigation Derived Wastes (IDW) Plan

Efforts will be made to minimize IDW generation. IDW may include groundwater, equipment decontamination fluids, disposable sampling equipment, and disposable personal protective equipment (PPE).

Field personnel will attempt to return unused soils to their source immediately after generation or, if warranted, containerize and return to the ESP laboratory for proper disposal. Disposable PPE and disposable sampling equipment will generally be handled as solid waste, containerized, and properly disposed. Groundwater purge water and wash and rinse waters generated during equipment decontamination will generally be discharged to the municipal storm water collection system or, if warranted, containerized and returned to the ESP laboratory for proper disposal.

7.0 Site Safety

A safety briefing will be held on-site prior to initiating field activities and field personnel will be required to read and sign the site-specific health and safety plan. The site safety plan is attached as Appendix A.

8.0 Reporting

ESP will prepare a Sampling Report including a copy of the field notes, chain of custodies and laboratory result sheets. SAU will prepare a Site Inspection Investigation Report.

REFERENCES

ATSDR, 2014 — Agency for Toxic Substances and Disease Registry. Toxicological Profile for Trichloroethylene. US Department of Health and Human Services. October 2014. https://www.atsdr.cdc.gov/toxprofiles/tp19.pdf

Bachle, 2017 — Bachle, Peter, Memorandum to Amanda Branson, Subject: Addendum Geohydrologic Summary of the Camdenton TCE Sites, September 8, 2017.

Carr, 2009 — Carr, Travis and Christine Kump-Mitchell, Operation and Maintenance Inspection Report, Modine Manufacturing Company, September 2009.

CH2M, 2009 — CH2MHILL, Final RCRA Facility Investigation Report, Modine Manufacturing Facility, Camdenton, Missouri, July 2009.

Elfrink, 1999 — Elfrink, Neil, Memorandum to Valerie Wilder, Subject: Hydrogeologic Report for the Camdenton Sludge Disposal Area Site, March 30, 1999.

MDNR, 2012 — Missouri Department of Natural Resources, QAPP for Pre-Remedial, Pre-Removal and Targeted Brownfields Assessments, December 7, 2012.

MDNR, 2017a — Missouri Department of Natural Resources, Pre-CERCLIS Site Screening Report, September 6, 2017.

MDNR, 2017b — Missouri Department of Natural Resources, Abbreviated Preliminary Assessment Report, September 8, 2017.

NJDEP, 2016 New Jersey Department of Environmental Protection, Vapor Intrusion Technical Guidance, August 2016, Version 4.

http://www.nj.gov/dep/srp/guidance/vaporintrusion/vig_main.pdf

SLP, 1972 Springfield News Leader, Fires Fumes-Forced Evacuation Praised by Lake Area Workers, July 18, 1972.

USEPA, 1990 U.S. Environmental Protection Agency, Hazard Ranking System, 40 CFR Part 300, Appendix A, 55 FR 51583, December 14, 1990, http://www.thefederalregister.com/d.p/2007-05-25-E7-10055.

USEPA, 2005 U.S. Environmental Protection Agency, Use of dynamic work strategies under a triad approach for site assessment and cleanup- Technology Bulletin. September, 2005.

https://clu-in.org/download/char/dwsbulletin.pdf

USEPA, 2014 U.S. Environmental Protection Agency, Engineering Issue: Challenges in Bulk Soil Sampling and Analysis for Vapor Intrusion Screening of Soil, 2014.

https://clu-in.org/download/issues/vi/VI-engineering-issue-600R14277.pdf

USEPA, 2015a U.S. Environmental Protection Agency (EPA). 2015. OSWER Technical

Guidance for Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air. OWWER Publication 9200.2-154.
http://www.epa.gov/osw/hazard/correctiveaction/eis/vapor.htm

USEPA, 2016a U.S. Environmental Protection Agency (EPA). 2015. Quickscore User's Guide Version 3.1.1, June 2016.
https://www.epa.gov/sites/production/files/2016-08/hrsquickscoreinstallerv311.exe

USEPA, 2016b U.S. Environmental Protection Agency, Vapor Intrusion Screening Level Calculator, accessed December 20, 2016.
http://www.epa.gov/oswer/vaporintrusion/documents/VISL-Calculator.xlsm

USEPA, 2017 U.S. Environmental Protection Agency, High-Resolution Site Characterization (HRSC) Resource Webpage, EPA CLU-IN website, accessed June 26, 2017.
https://clu-in.org/characterization/technologies/hrsc/

SIGNATURES

Prepared by:

Michael Stroh
Environmental Scientist
Site Assessment Unit
Hazardous Waste Program

for Ken Hannon
Ken Hannon
Environmental Specialist
Field Services Unit
Environmental Services Program

Approved by:

Valerie Wilder
Section Chief
Superfund Section
Hazardous Waste Program

Date: September 25, 2017

APPENDIX A

Figures

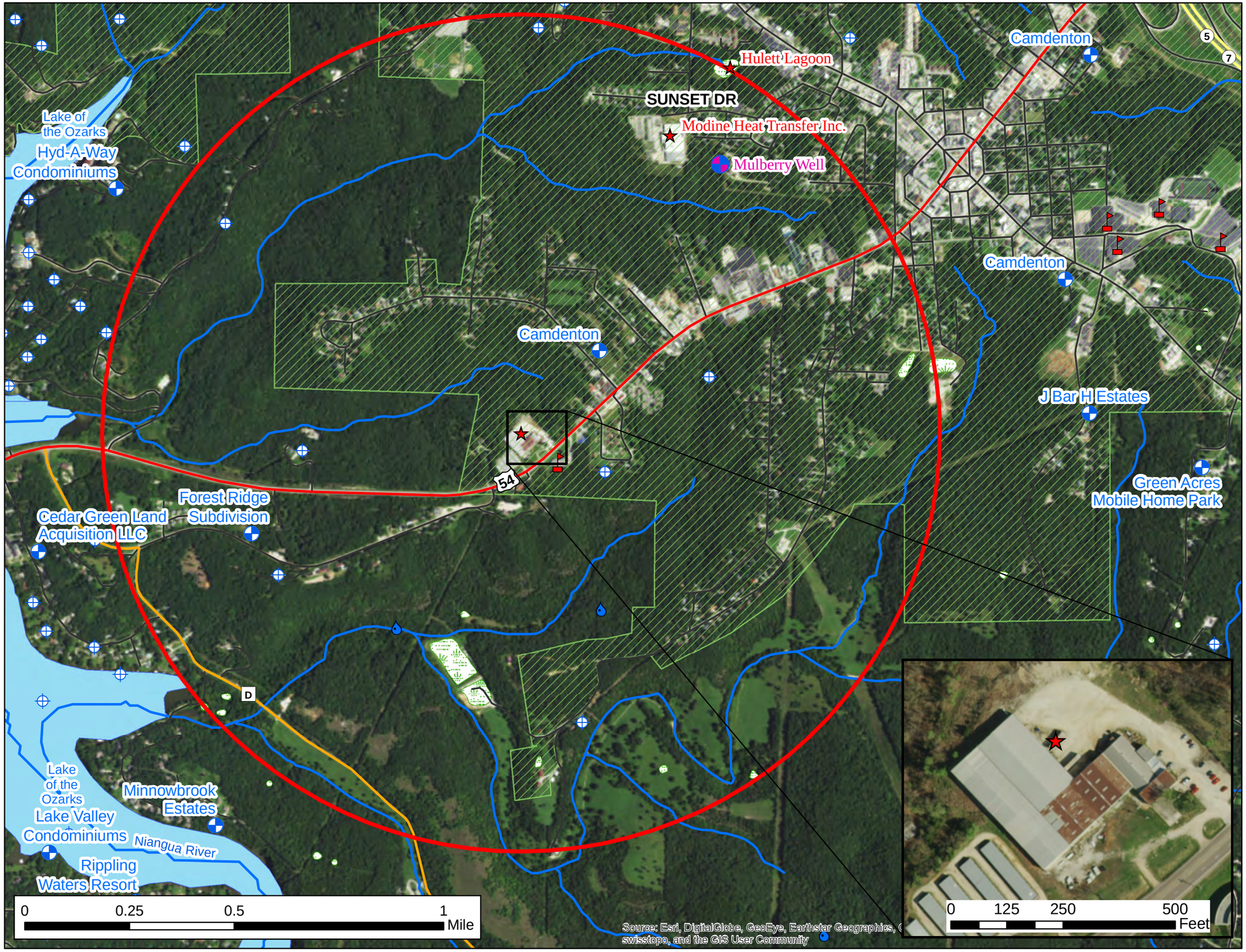
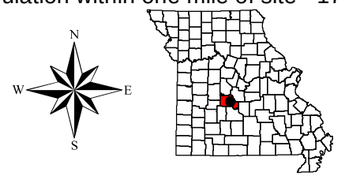


Figure 1: Site Location Map
Dawson Metal Products
Camdenton Facility #2 Site
1225 W US Highway 54
Camden County, Missouri
September 2017

Legend

- One-Mile Radius
- Dawson Metal Products Facility
- Modine Manufacturing Co.
- Hulett Lagoon
- Mulberry Well (Inactive)
- Springs
- Public Wells
- Private Drinking Water Wells
- Public Schools
- Local Roads
- Federal Highway
- State Lettered Highway
- State Numbered Highway
- Rivers and Streams
- National Wetland Inventory
- Major Lakes
- Municipal Boundary

Population within one mile of site =1707



Created on: August 29, 2017 by Hillary Wakefield. This map is located at M/Superfund/Dawson Metal Products Camdenton Facility #2/SAP_Figure1_SiteLocationMap.mxd

Base Map: National Agriculture Imagery Program (NAIP) ortho photography. Flight Date: 2014
Data Sources: US Census 2010; Missouri Department of Transportation

Although data sets used to create this map have been compiled by the Missouri Department of Natural Resources, no warranty, expressed or implied, is made by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the department in the use of these data or related materials.

MISSOURI DEPARTMENT OF NATURAL RESOURCES

This is an image

Figure 2. Street View of 1225 West Highway 54





Figure 3. 1225 West Highway 54, aerial photograph dated 1995 (Google Earth)



Figure 4. 1225 West Highway 54, aerial photograph dated 2014 (Google Earth)



Figure 5. 1225 West Highway 54, aerial photograph dated 2015 (Google Earth)



Figure 6. 1225 West Highway 54, aerial photograph dated 2016 (Google Earth)

Figure 7. 1972 Building Layout 1225 W. Highway 54
Source: former employees of Dawson Metal Products

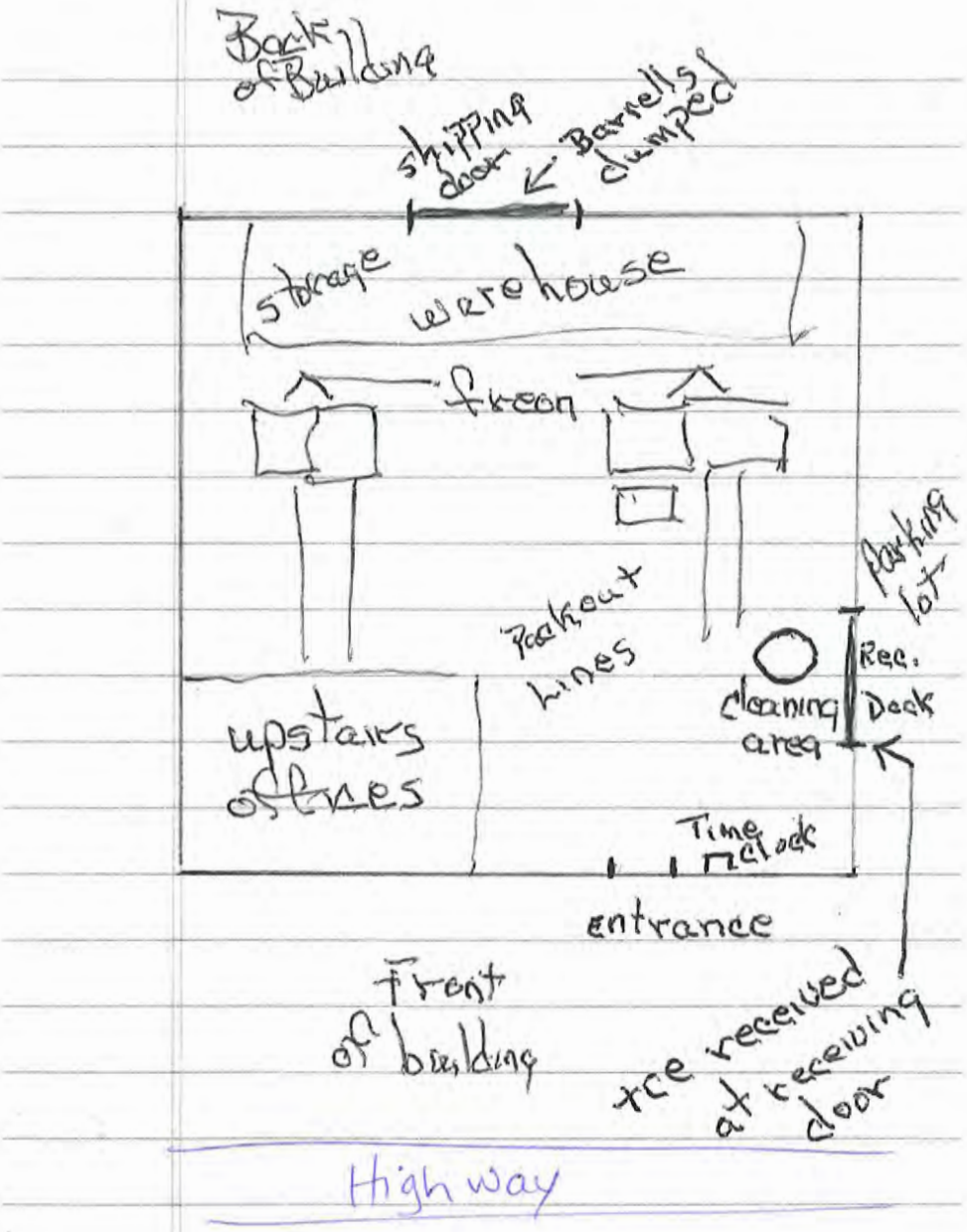
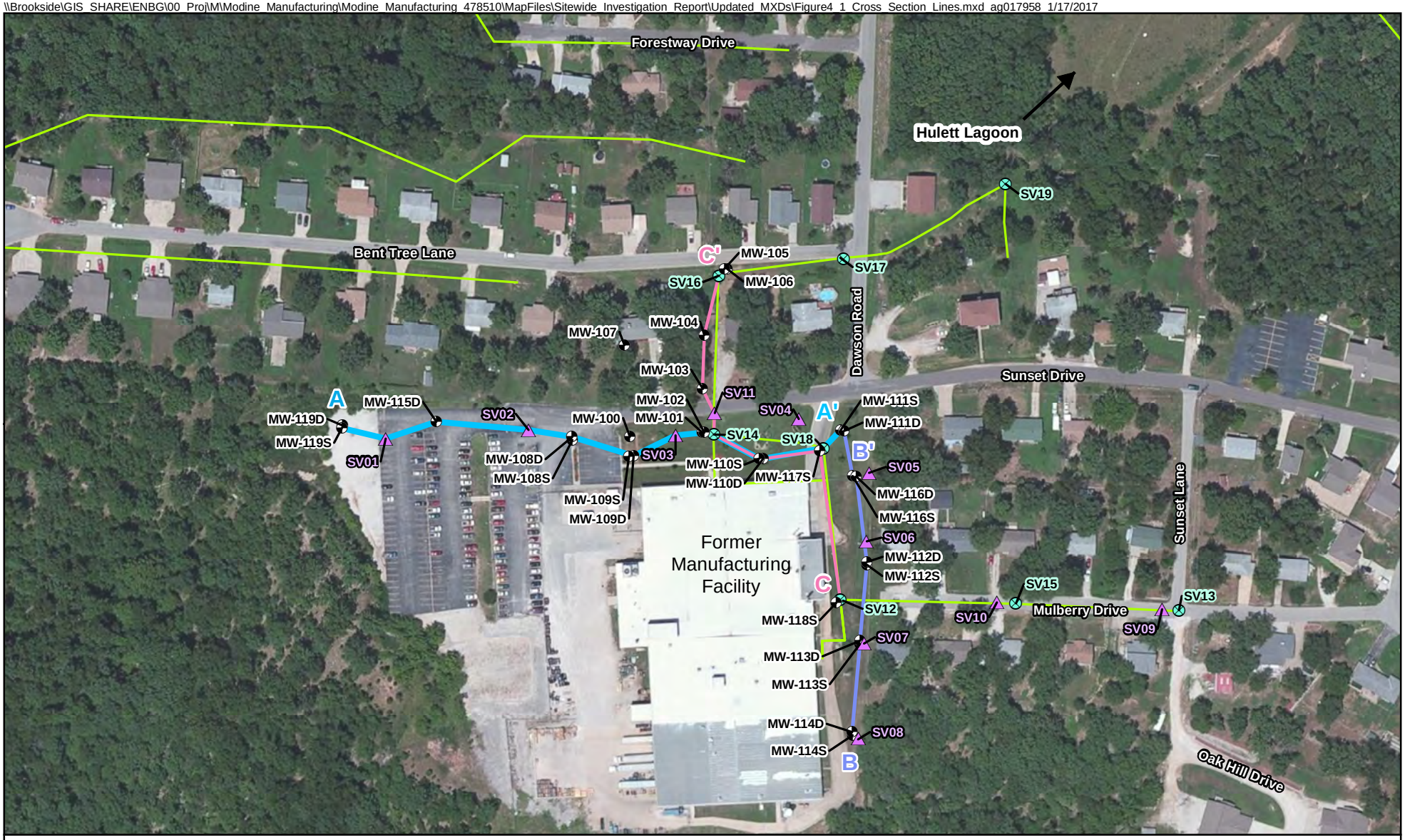


Figure 8. Loading Dock, View Looking South



Figure 9. Plan View Modine Site Transects

\\Brookside\GIS_SHARE\ENBG\00_Proj\M\Modine_Manufacturing\Modine_Manufacturing_478510\MapFiles\Sitewide_Investigation_Report\Updated_MXDs\Figure4_1_Cross_Section_Lines.mxd ag017958 1/17/2017



Legend

- Monitoring Well
- Exterior Soil Vapor Probe
- Sanitary Sewer Manhole
- Sanitary Sewer Line
- Cross-Section Transect A-A'
- Cross-Section Transect B-B'
- Cross-Section Transect C-C'

BASE MAP SOURCE:
USDA, Farm Service Agency (FSA), National Agriculture Imagery Program (NAIP), 2014

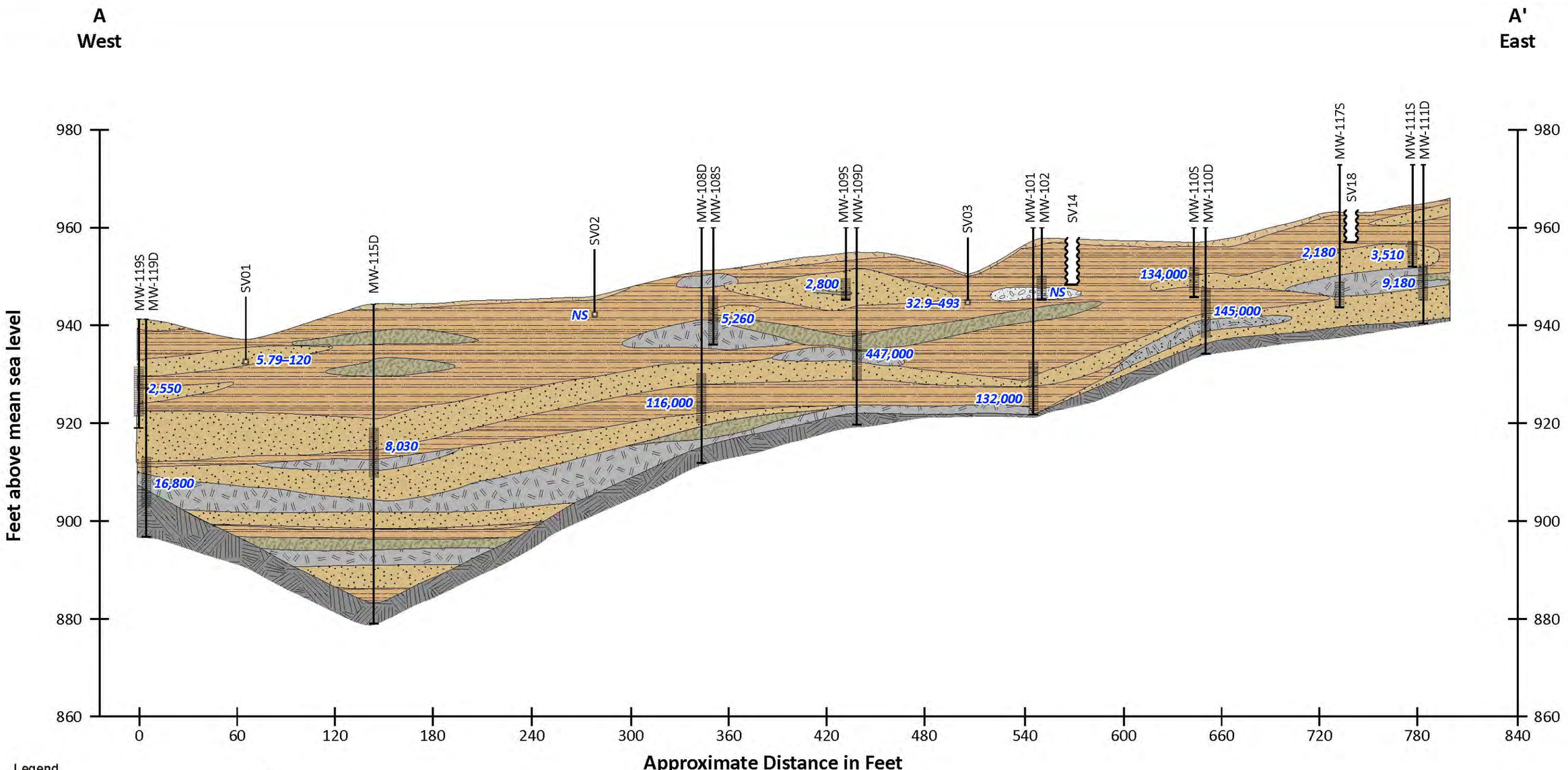
N
W E
S

0 200 400
Feet

FIGURE 4-1
Cross-Section Transects
Phase I Sitewide Soil Vapor Investigation Report
221 Sunset Drive, Camdenton, MO

ch2m

Figure 10. Cross Section Of Modine Site A to A'



Legend

- Topsoil
- Clay (Sandy clay and silty clay)
- Chert (Sand with chert and clay with chert)
- >50% Sand (Clayey sand and silty sand)
- Gravel
- Weathered Rock
- Bedrock
- Well Screen
- *3,120* TCE in soil vapor (µg/m³)
- Sewer Manhole
- Exterior Soil Vapor Probe

Notes:
NS = not sampled due to water in probe
TCE = trichloroethene
µg/m³ = micrograms per cubic meter

Cross-section transect depicting generalized/simplified representations of subsurface geologic conditions beneath the site.

Figure 4-2
Cross Section A-A'
Phase I Sitewide Soil Vapor Investigation Report
221 Sunset Drive
Camdenton, Missouri

ch2m:

EN1117161155MKE Fig4-2_A-A'_Sunset_v4.ai 04.27.17 tdaus

Figure 11. Cross Section Modine Site B to B'

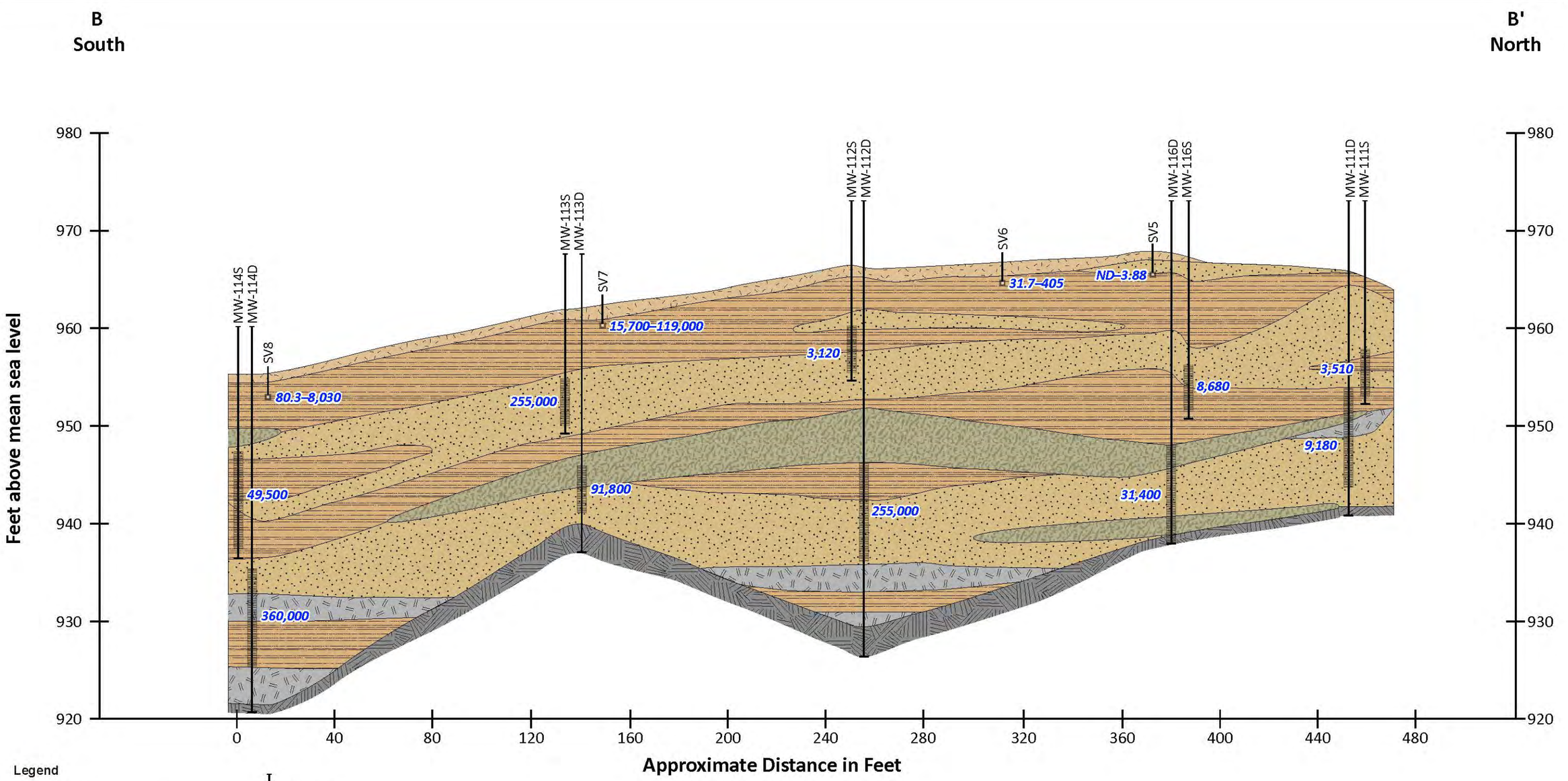
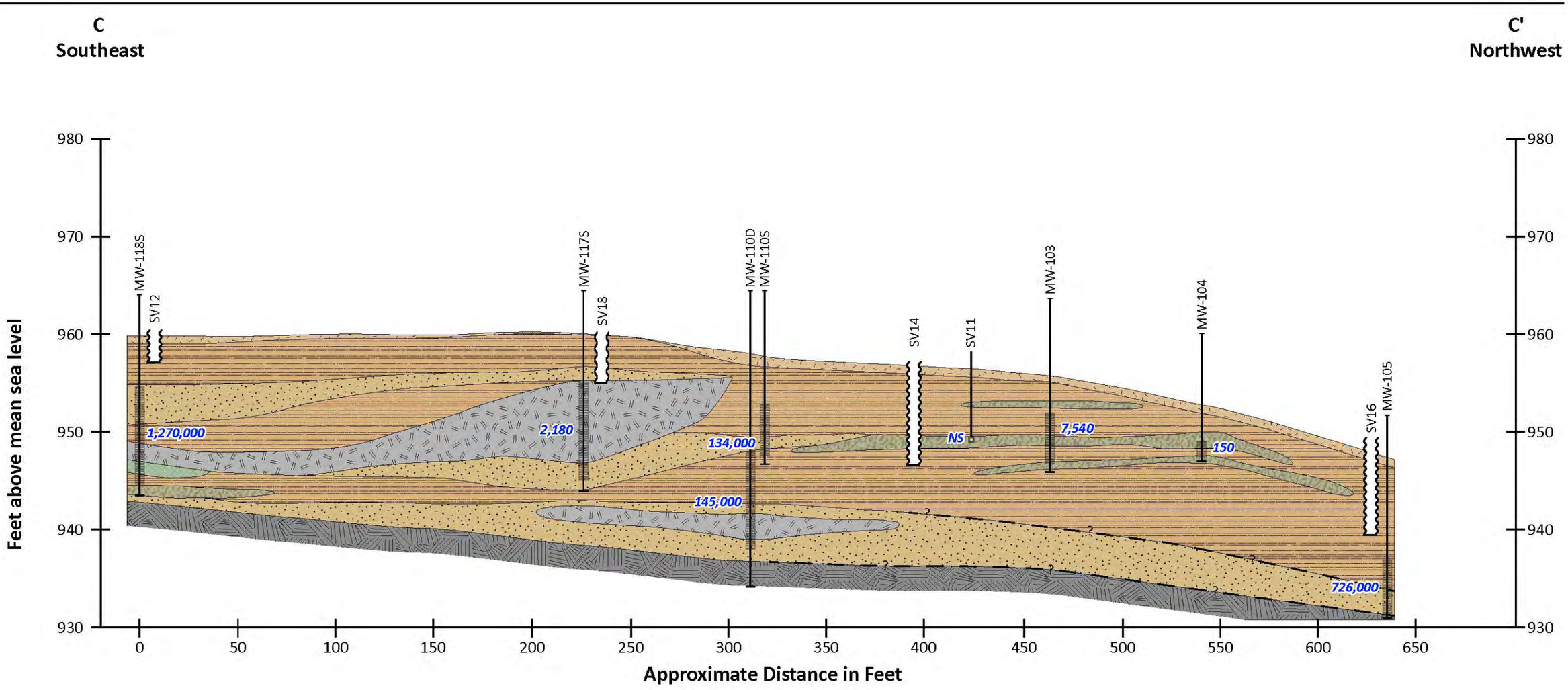


Figure 4-3
Cross Section B-B'
Phase I Sitewide Soil Vapor Investigation Report
221 Sunset Drive
Camdenton, Missouri

EN1117161155MKE Fig4-3_B-B'_Sunset_v4.ai 04.27.17 tdaus

Figure 12. Cross Section Modine Site C to C'



Legend

- Topsoil
- Clay (Sandy clay and silty clay)
- Chert (Sand with chert and clay with chert)
- Fresh Chert and Limestone
- >50% Sand (Clayey sand and silty sand)
- Weathered Rock
- Bedrock

- Well Screen
- *3,120* TCE in soil vapor (µg/m³)
- Sewer Manhole
- Exterior Soil Vapor Probe

Notes:
TCE = trichloroethene
µg/m³ = micrograms per cubic meter

Cross-section transect depicting generalized/simplified representations of subsurface geologic conditions beneath the site.

Figure 4-4
Cross Section C-C'
Phase I Sitewide Soil Vapor Investigation Report
221 Sunset Drive
Camdenton, Missouri

EN1117161155MKE Fig4-4_C-C'_Sunset_v4.ai 04.27.17 tdaus

Figure 13. Standing Water at Southwest Corner of Building

APPENDIX B

Health and Safety Plan

MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES PROGRAM

SITE HEALTH AND SAFETY PLAN

1.0 INTRODUCTION

This plan has been prepared for implementation by DNR employees, using operating procedures for which they are specifically trained. Any use of the plan by other agencies, organizations, or private individuals is at their own risk.

2.0 KEY PERSONNEL

MDNR OSC: Kenneth Hannon SAFETY OFFICER: Kenneth Hannon

OTHER MDNR PERSONNEL/TITLE:

Ken Hannon, Environmental Specialist

Sean Counihan, Environmental Specialist

Amanda Branson, Environmental Specialist

Michael Stroh, Environmental Specialist

3.0 SITE INFORMATION Site

name Dawson Metals Site Sampling County/City: Camden/Camdenton

date: October 2-6, 2017 Site Description: Dawson Metals site is a former metal manufacturing facility. The company worked at this location during 1972. TCE was used as a solvent to clean parts. This sampling event is to determine if any hazards remain and threaten human health or the environment.

3.1 Overall Incident Risk/Hazard Analysis

Chemical: _____Serious _____Moderate __X__Low _____Unknown

Physical: _____Serious _____Moderate __X__Low _____Unknown

3.2 Contaminant(s) of Concern: TCE and its breakdown chemicals.

3.2.1 Physical State: __X__Liquid __X__Solid _____Sludge __X__Gas/Vapor

Chemical Characteristics: (check all that apply)

__X__a. carcinogen	_____b. biological	_____c. corrosive	__X__d. combustible
_____e. explosive	__X__f. flammable	__X__g. volatile	__X__h. poison
_____i. radioactive	_____j. reactive	_____k. other: _____	

3.2.2 Physical Hazards: (check all that apply)

a. _X_ overhead _____ b. below grade _____ c. confined space[*X] _X_ d. noise
e. _X_ splash _____ f. fire/burn _____ g. puncture _X_ h. heat stress
i. _X_ cut _X_ j. slip/trip/fall _____ k. cold stress _____ l. electrical
m. _X_ mechanical/heavy equipment _____ n. other: _____

[*] The need for confined space entry by ESP personnel shall be evaluated on a site-by-site basis. A confined space entry permit must be signed by the appropriate Unit or Section Chief prior to ESP employees entering a confined space (29 CFR 1910.146). Confined space entry shall be screened in at least Level B prior to downgrade. **Adequate resources must be available and specific planning and tasks determined before confined space entry is initiated.**

3.3 Task-Specific Risk Analysis (attach additional sheets as necessary)

Task Description	Chemical Hazards	Physical Hazards	Level of Protection
Groundwater/soil boring Sampling	a d f g h	a d e h i j m	D
Private well & spring sampling	a d f g h	a h j	D
Air/subslab Sampling	a d f g h	a d h i j m	D

4.0 MEDICAL SURVEILLANCE AND PERSONNEL TRAINING REQUIREMENTS

All ESP field personnel participate in a medical monitoring program and are trained at least to the level of "Hazardous Substance Emergency Response-Technician" as required and specified in the department's written health and safety program located in Section 2 of the MDNR-Hazardous Substances Emergency Response Plan (HSERP). The written policy satisfies requirements set out in 29 CFR 1910.120. MDNR ESP's respiratory protection program meets the requirements of 29 CFR 1910.134.

ESP personnel will ascertain as much information as possible regarding health and safety issues associated with the site prior to initial entry. Information shall include chemical and physical hazards as listed above, types and amounts of materials involved, and citizens/areas threatened by the incident.

5.0 PERSONAL PROTECTIVE EQUIPMENT

ESP shall utilize the Protection Level categories defined in 29 CFR 1910.120, Appendix B, and known as Levels A, B, C, and D. Refer to Section 2 of the MDNR-HSERP for definitions of Protection Levels. ESP personnel shall inspect APRs and SCBAs at least monthly and maintain a record of such to ensure equipment is functional.

Levels of protection shall be reassessed and upgraded as conditions change and information is updated to comply with worker safety while performing site activities.

Action Levels for evacuation of work zone pending reassessment of conditions:

Level D: O_2 < 19.5% or > 25%; explosive atmosphere > 10% LEL; organic vapors > background levels; other_____.

Level C: O_2 < 19.5% or > 25%; explosive atmosphere > 20% LEL; organic vapors (in breathing zone) > 5 m.u.; other _____.

Level B: O_2 Explosive atmosphere > 20% LEL; unknown organic vapors (in breathing zone) > 500 m.u.; other_____.

Level A: ESP personnel shall evaluate the need for entry on a site-specific basis and may utilize its emergency response contractor for Level A situations which may arise.

6.0 FREQUENCY AND TYPE OF AIR MONITORING/SAMPLING

Instrument	Contaminant of Concern	Sample Location (Area/Source)	Frequency	Odor Threshold/ Description
N/A				

7.0 SITE CONTROL MEASURES

7.1 The "Buddy-System": ESP personnel performing any work activities within the exclusion zone shall employ the "buddy-system" at all times, as required and defined in Section 2 of the MDNR-HSERP. The "buddy-system" may not be required while an ESP staff member is observing or providing oversight of cleanup activities performed by a contractor or responsible party.

7.2 Safe work Practices: Refer to Section 2 of the MDNR-HSERP for written safety practices to be followed at all times by ESP personnel while on-site at an incident.

7.3 Site Communications: The use of two-way radios or establishment of hand signals for communications shall be determined prior to entering the work zone and followed by ESP personnel.

7.4 Radiation Safety: Due to the possibility of an unknown radiation hazard being present on a site, ESP personnel shall be required to wear radiation indicator badges (TLD badges) while on-site.

7.5 Work Zones: ESP personnel shall ensure work zones are established and be aware of their locations.

8.0 DECONTAMINATION PROCEDURE/SOLUTIONS:

Personnel: Gloves and clothing will be placed in a garbage bag and returned to Jefferson City for proper disposal.

Equipment: Returned to Jefferson City for proper decontamination or field decontaminated.

Instruments: Returned to Jefferson City for proper decontamination or disposed of back in Jefferson City.

Decontamination fluids/materials may be to be containerized for proper disposal or combined with St. Louis City waste.

9.0 EMERGENCY INFORMATION:

In the event of an emergency, notify the MDNR Environmental Emergency Response Office at 573/634-2436. The Duty Officer will make the appropriate notifications.

10.0 ADDITIONAL EMERGENCY INFORMATION/NUMBERS:

Hospital: Lake Regional Hospital, 54 Hospital Drive, Osage Beach, MO 573-348-8000

Location/Specific directions from Site: See attached map

	Name/Location	Telephone Number
Ambulance:	Camden Ambulance District	911
Police/Sheriff:	Camdenton PoliceDepartment	911
Fire:	Camdenton Fire Department	911
Poision Control:		
Cellular Telephones/Other:		

1) Central Accident Reporting Office- WORK RELATED INJURY 1-800-624-2354

This number is to be called in the event of a NON LIFE THREATENING injury PROIR to seeking medical care.

11.0 SIGNATURES

ESP personnel shall certify they have read the plan and addressed any questions regarding worker health and safety by signing and dating below followed by printing their name and title.

Signature	Printed Name/Title	Date	TLD Badge


Turn left at the 1st cross street onto Hospital Dr
Turn left onto Ozark Care Dr
Turn right onto Old U.S. 54 (signs for Business 54/Osage County Pkwy)
Turn left onto Old U.S. 54/Osage Beach Pkwy
Linn Creek
Camden
Camdenton
Head northeast on US-54 E toward Hopkins Cir
Hugo
4 mi
N
Google Earth
© 2017 Google


Turn right to stay on Hospital Dr
Turn left at the 1st cross street onto Hospital Dr
Turn left onto Ozark Care Dr
U.S. 54 Expy
Nichols Rd
Hospital Dr
Old State Park Rd
Village Ln
Ozark Care Dr
Lions Rd
Kk
Google Earth
© 2017 Google
N
1000 ft

APPENDIX C

Field Sheets and

Chain of Custody Forms

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery

☐ Tape sealed and initialed — Total No. Of Containers:
☐ Shipped — Carrier:
☐ Hand Delivered — By:

Collector's Name:
(Please Print)

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☐ ESP
☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!

Laboratory ID: | Location:

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type	Field Parameters *(include units)*	Matrix *(check one)*	Container Type	Preservative Type	Number of Containers
(Sample A)	Date:		*(check one)* ☐ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. / Flow / pH / Cond. / Temp. / Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							
(Sample B)	Date:		☐ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. / Flow / pH / Cond. / Temp. / Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							
(Sample C)	Date:		☐ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. / Flow / pH / Cond. / Temp. / Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							
(Sample D)	Date:		☐ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. / Flow / pH / Cond. / Temp. / Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							

Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A | **LDPR:** | **Job Code:** | **Sample Reference ID:**

Facility ID: | **Site/Study Name:** | **County:**

Sample Comment (where and how the sample was collected): ☐ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	**X Easting**	**Y Northing**	**Accuracy** *(check one)*
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
- ☐ Bypass/SSO
- ☐ Complaint
- ☐ Emergency Response
- ☐ Inspection
- ☐ Investigation
- ☐ Monitoring
- ☐ Special Project

Sample Type: *(check one)*
- ☐ Air
- ☐ Container
- ☐ QA/QC
- ☐ Groundwater
- ☐ Organic
- ☐ Sediment
- ☐ Sludge
- ☐ Drinking Water Supply
- ☐ Soil
- ☐ Spill
- ☐ Wipes
- ☐ Storm Water
- ☐ Surface Water
- ☐ Discharge

Sample B | **LDPR:** | **Job Code:** | **Sample Reference ID:**

Facility ID: | **Site/Study Name:** | **County:**

Sample Comment (where and how the sample was collected): ☐ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	**X Easting**	**Y Northing**	**Accuracy** *(check one)*
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
- ☐ Bypass/SSO
- ☐ Complaint
- ☐ Emergency Response
- ☐ Inspection
- ☐ Investigation
- ☐ Monitoring
- ☐ Special Project

Sample Type: *(check one)*
- ☐ Air
- ☐ Container
- ☐ QA/QC
- ☐ Groundwater
- ☐ Organic
- ☐ Sediment
- ☐ Sludge
- ☐ Drinking Water Supply
- ☐ Soil
- ☐ Spill
- ☐ Wipes
- ☐ Storm Water
- ☐ Surface Water
- ☐ Discharge

Sample C | **LDPR:** | **Job Code:** | **Sample Reference ID:**

Facility ID: | **Site/Study Name:** | **County:**

Sample Comment (where and how the sample was collected): ☐ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	**X Easting**	**Y Northing**	**Accuracy** *(check one)*
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
- ☐ Bypass/SSO
- ☐ Complaint
- ☐ Emergency Response
- ☐ Inspection
- ☐ Investigation
- ☐ Monitoring
- ☐ Special Project

Sample Type: *(check one)*
- ☐ Air
- ☐ Container
- ☐ QA/QC
- ☐ Groundwater
- ☐ Organic
- ☐ Sediment
- ☐ Sludge
- ☐ Drinking Water Supply
- ☐ Soil
- ☐ Spill
- ☐ Wipes
- ☐ Storm Water
- ☐ Surface Water
- ☐ Discharge

Sample D | **LDPR:** | **Job Code:** | **Sample Reference ID:**

Facility ID: | **Site/Study Name:** | **County:**

Sample Comment (where and how the sample was collected): ☐ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	**X Easting**	**Y Northing**	**Accuracy** *(check one)*
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
- ☐ Bypass/SSO
- ☐ Complaint
- ☐ Emergency Response
- ☐ Inspection
- ☐ Investigation
- ☐ Monitoring
- ☐ Special Project

Sample Type: *(check one)*
- ☐ Air
- ☐ Container
- ☐ QA/QC
- ☐ Groundwater
- ☐ Organic
- ☐ Sediment
- ☐ Sludge
- ☐ Drinking Water Supply
- ☐ Soil
- ☐ Spill
- ☐ Wipes
- ☐ Storm Water
- ☐ Surface Water
- ☐ Discharge

Remarks:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Field GC Sample Analysis Log

Date	Ellvin Folder name	File Name, Log-	Sample Description	Mass Detected, µg/kg (soil) or ug/l (water)	
				TCE	Cis DCE

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Field GC Sample Analysis Log

Date	Ellvin Folder name	File Name, Log-	Sample Description	Mass Detected, µg/kg (soil) or ug/l (water)	
				TCE	Cis DCE

MISSOURI DEPARTMENT OF NATURAL RESOURCES

PHOTOGRAPH LOG

Date	Time	Collec-tor	Description

MISSOURI DEPARTMENT OF NATURAL RESOURCES

PHOTOGRAPH LOG

Date	Time	Collec-tor	Description

MISSOURI DEPARTMENT OF NATURAL RESOURCES

SAMPLE LOG

Date	Time	Collec-tor	Matrix	Description/Comments

MISSOURI DEPARTMENT OF NATURAL RESOURCES

SAMPLE LOG

Date	Time	Collec-tor	Matrix	Description/Comments

*Samples collected in 5gm En Core ® samplers (soil) or 40 ml amber glass vials (water) and stored on ice.

Relinquished by: _____ Received by:_____ Date: _____ Time:_____

Relinquished by: _____ Received by:_____ Date: _____ Time:_____

Relinquished by: _____ Received by:_____ Date: _____ Time:_____

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Vapor Intrusion Field Form

Site/Location ID: _____

Part 1: Physical Building Inspection

Preparer's name: _____ Date/Time prepared: _____

1. Occupant information

Occupant name(s): _____ Interviewed: ☐ Yes ☐ No

Mailing address: _____

City: Jefferson City State: MO Zip code: _____

Phone: _____ Fax: _____ E-mail: _____

Number of occupants at this location: _____ Age range of occupants: _____

2. Owner/Landlord information (Check if same as occupant: ☐)

Occupant name(s): _____ Interviewed: ☐ Yes ☐ No

Mailing address: _____

City: _____ State: _____ Zip code: _____

Home phone: _____ Office phone: _____

3. Building type (Check appropriate response)

☐ Residential ☐ Industrial ☐ School ☐ Church ☐ Commercial/Multi-use

☐ Other (specify): _____

If the property is residential, what type? (Check appropriate response)

☐ Ranch rambler ☐ Raised rambler ☐ Townhouses/Condos ☐ Duplex ☐ Modular ☐ 2-Family

☐ Split level ☐ Contemporary ☐ Apartment house ☐ Cape cod ☐ Log home ☐ 3-Family

☐ Colonial ☐ Mobile home ☐ Other (specify): _____

4. Building description

If the property is commercial or industrial, describe the business use(s):

Indicate the number of floors and general use of each floor of the building beginning with lowest level:

Bottom floor is walk out. Used for vehicle maintenance. A small office and bathroom . IT services center is located in the northwest corner.

Upper floor is cubicle office space

If there are multiple residential units, indicate how many units: _____ When was building constructed: Unknown

☐ Yes
☐ No

Type of insulation used in building: _____ Elevators or lifts:

Basement/Lowest level depth below grade: _____ (feet)

Observed basement characteristics (Check all that apply)

Is basement/lowest level occupied:	☐ Full time	☐ Occasionally	☐ Almost never		
Basement type:	☐ Full	☐ Crawlspace	☐ Slab	☐ Other:	
Floor materials:	☐ Concrete	☐ Dirt	☐ Stone	☐ Other:	
Floor covering:	☐ Uncovered	☐ Covered	☐ Covered with:		
Concrete floor:	☐ Unsealed	☐ Sealed	☐ Sealed with:		
Foundation walls:	☐ Poured	☐ Block	☐ Stone	☐ Other:	
Basement finished:	☐ Unfinished	☐ Finished	☐ Partially finished		
Basement wetness:	☐ Wet	☐ Damp	☐ Seldom	☐ Moldy	
Sump pump	☐ Yes ☐	If yes, was water present: ☐ Yes ☐ No			

present:	No	

Indicate sources of water supply sources (i.e., drinking, irrigation, etc.) and type of sewage disposal
(Check all that apply)

Water supply:	☐ Public water	☐ Drilled well	☐ Driven well	☐ Dug well	
Water Treatment:	☐ Softener	☐ Charcoal filter	☐ Reverse osmosis	☐ Distilling	☐ Other:
Sewage disposal:	☐ Public sewer	☐ Septic tank	☐ Leach field	☐ Dry well:	

5. Heating, venting, air conditioning, or other building controls (Check all that apply)

Type of heating system(s) used in this building (Check all that apply)

☐ Hot air circulation ☐ Space heaters ☐ Electric baseboard ☐ In-floor heating ☐ Heat pump

☐ Steam radiation boiler ☐ Wood stove ☐ Hot water baseboard ☐ Radiant floor ☐ Outdoor wood

☐ Other (specify): _____ **Primary type:** _____

Were alternative types of heating systems used during sampling? ☐ Yes ☐ No Type: _____

Primary type of fuel used (Check appropriate response)

☐ Natural gas ☐ Fuel oil ☐ Kerosene ☐ Electric ☐ Propane

☐ Solar ☐ Wood ☐ Coal

If hot water tank present, indicate fuel source: _____

Boiler/furnace is located in:	☐ Basement	☐ Outdoors	☐ Main floor	☐ Other:	
Type of air conditioning:	☐ Central air	☐ Window units	☐ Open windows	☐ No mechanical system	

Are there air distribution ducts present: ☐ Yes ☐ No

Describe the supply and cold air return ductwork and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

6. Grid plans

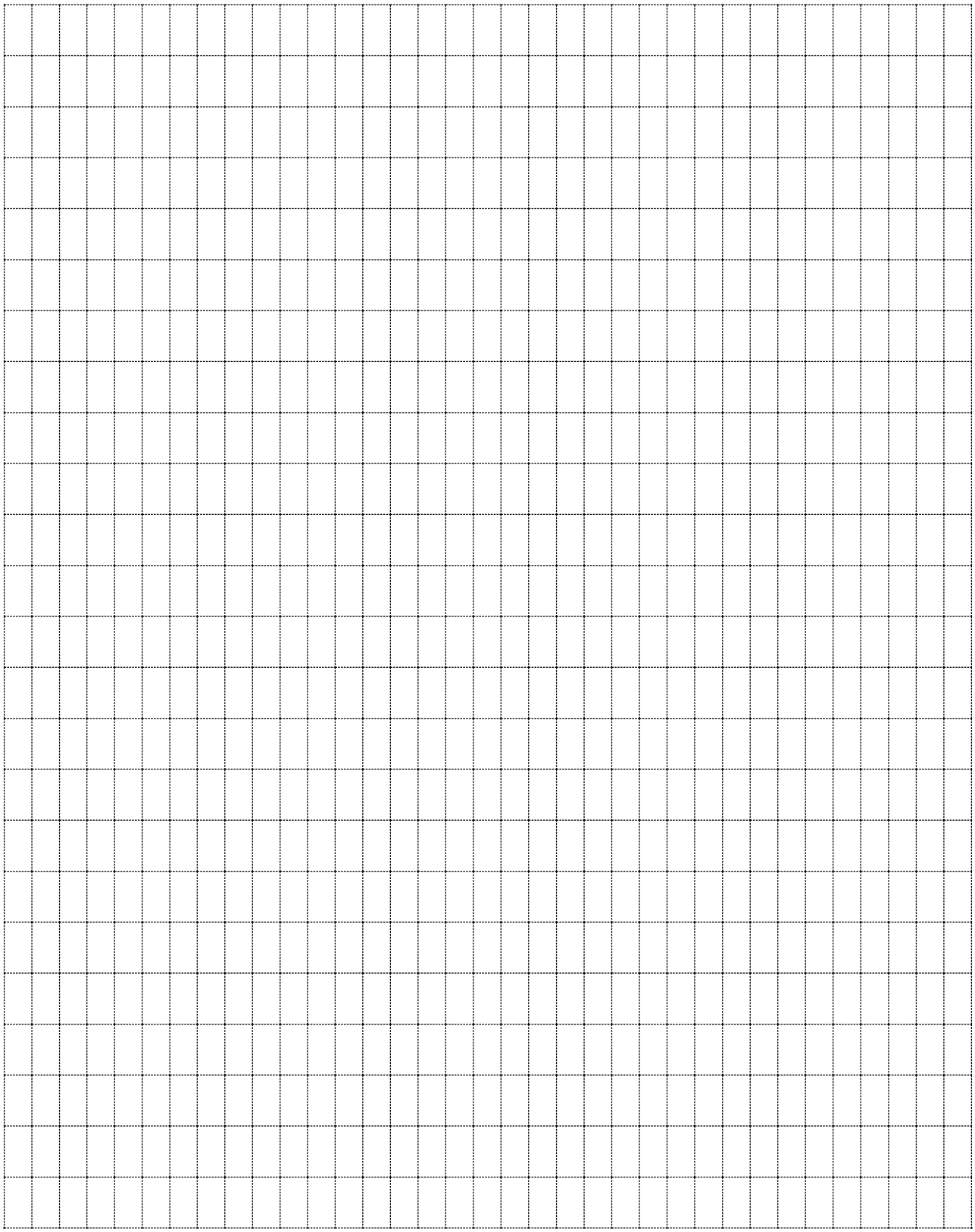
Use grid plans to describe floor plans, locate potential soil vapor entry points (e.g., cracks, utility ports, drains); and if applicable, identify sample locations (sub-slab, indoor air, outdoor air sampling).

Floor plan for basement or lowest level:

Floor above lowest level:

Outdoor grid plot (Include if outdoor ambient air samples collected):

Insert sketch (or attach separate document) of the area outside the building and locate outdoor air sample locations.
If applicable, provide information on spill locations, potential air contamination sources, locations of wells, septic system, etc., and PID meter readings. Indicate wind direction and speed during sampling.



Part 2: Indoor Air Quality Survey

Complete if indoor air sampling is conducted (use grids in Part 1 for labeling sampling locations).

Factors that may influence indoor air quality:

Is there an attached garage:	☐ Yes ☐ No	Where:
Is there smoking in the building:	☐ Yes ☐ No	How frequently:
Have any professional cleaning products been used recently:	☐ Yes ☐ No	When & type:
Have cosmetic products been used recently:	☐ Yes ☐ No	When & type:
Has painting/staining been done in the last 6 months:	☐ Yes ☐ No	Where & when:
Has any remodeling or construction occurred in the last 6 months:	☐ Yes ☐ No	Where & when:
Is there new carpet, drapes, or other textiles:	☐ Yes ☐ No	Where & when:
Have air fresheners been used recently:	☐ Yes ☐ No	When & type:
Are any gasoline powered devices or gasoline storage cans stored in any room, basement, or attached garage in this house or apartment?	☐ Yes ☐ No	Where & type:
Are there any pets that are kept indoors?	☐ Yes ☐ No	type:
Have pesticides/herbicides been used inside or outside of the home in the last week?	☐ Yes ☐ No	When & type:

Is there a clothes dryer:	☐ Yes ☐ No	If yes, is it vented outside:	
Are there odors in the building:	☐ Yes ☐ No	If yes, please describe:	

Do any of the building occupants use solvents at work: ☐ Yes ☐ No

If yes, what types of solvents are used: _____

Do any of the building occupants regularly use or work at a dry-cleaning service: ☐ Yes ☐ No

If yes, indicate approximately how frequent: _____

Product inventory form (Add additional rows if needed)

List products identified in the building that have the potential to contribute contaminants of concern to indoor air:

Location	Product description*	Comments	Instrument readings if taken and units

* Describe the condition of the product containers as Unopened (UO), Used (U), or Deteriorated (D).
Include photographs of product containers as appropriate to document products and ingredients.

Site Inspection Sampling Report

Dawson Metal Products Camdenton Facility #2 Site
Camdenton, Missouri
Camden County

October 2-4, 2017

Prepared For:

Missouri Department of Natural Resources
Division of Environmental Quality
Hazardous Waste Program

Prepared By:

Missouri Department of Natural Resources
Division of Environmental Quality
Environmental Services Program

Table of Contents

1.0 Introduction 1

2.0 Site Description and History 1
2.1 Location 1
2.2 Description 1
2.3 Site History/Contaminants of Concern 1

3.0 Methods 2
3.1 Field Procedures 2
3.1.1 Soil Sampling 2
3.1.2 Water Sampling 3
3.1.2.1 Surface water sampling 3
3.1.2.2 Drinking water wells 3
3.1.3 Indoor and Ambient Air Sampling 4
3.1.4 Subslab Vapor Sampling 4
3.2 Sample Order 4
3.3 Sample Quantity 5
3.4 Chain-of-Custody 5
3.5 Analyses Requested 5

4.0 Data Quality 5
4.1 Field Methods 5
4.2 Field Decontamination 5
4.3 Field Quality Assurance/Quality Control Samples 6
4.3.1 Trip blank 6
4.3.2 Collocated samples 6
4.3.3 Duplicate samples 6
4.3.4 Replicate samples 6

5.0 Investigation Derived Wastes (IDW) 7

6.0 Observations 7

7.0 Data Reporting 7

Attachments. . . . . .Located at end of report
Tables
Table 1 – Soil sampling collection data
Table 2 – Water sampling collection data
Table 3 – Air sampling collection data
Appendix A - Analytical results
Appendix B – Chain of Custody/Field Notes

1.0 Introduction

As authorized under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986, the Missouri Department of Natural Resources (MDNR), Hazardous Waste Program (HWP), Site Assessment Unit is conducting a site inspection (SI) on the Dawson Metal Products Camdenton Facility #2 site (Dawson). The Dawson site is the location of a manufacturing facility in Camdenton, Missouri where a suspected release of trichloroethene (TCE) occurred in 1972. The MDNR, HWP requested the MDNR, Environmental Services Program (ESP) to implement a sampling plan as part of the SI. The objective of this investigation is to assess potential threats to human health and the environment at the site and to gather data necessary for the preparation of a preliminary site score under the Hazard Ranking System (HRS).

On October 2-4, 2017, ESP Environmental Specialists Kenneth Hannon, Sean Counihan, Alan Cortvrient, Ethan Musick, Eric Sappington, and Caleb Troutt traveled to the site to conduct sampling. HWP Environmental Specialists Michael Stroh, Hillary Wakefield and Amanda Branson were present during the sampling event. Information learned from field observations and sampling will be used by the HWP in scoring the site's potential as a hazardous waste site under the CERCLA Hazard Ranking System.

2.0 Site Description and History

2.1 Location

The center of the Dawson site is an 80,000 ft^2 manufacturing building located on an 11-acre parcel at 1225 West U.S. Highway 54, latitude 37.998918, longitude -92.763290. The parcel is located 1 mile southwest of the Camdenton city center and 1 mile northeast of the Niangua arm on the western portion of the Lake of the Ozarks. Geographic coordinates for the site were determined by the use of a Trimble GeoExplorer CE unit.

2.2 Description

The Dawson site consists of the main building at 1225 West Highway 54 and the area within a one mile radius of the site. The building itself is an 80,000 ft^2 manufacturing facility currently leased by the Eagle Claw Fishing Tackle Company. The remainder of the site consists of private homes within a one mile radius that contain a private well on their property and granted permission for MDNR personnel to sample their well.

2.3 Site History/Contaminants of Concern

Use of the property prior to 1972 is not known, but at that time a 15,000 ft^2 building was present. For approximately 1 year beginning in 1972, it has been alleged that the Dawson Metal Products company (later acquired by Hamilton Sundstrand Corporation, and then by Modine Manufacturing Company) used the building as a temporary manufacturing facility while repairs were made following a fire at their 221 Sunset Drive facility. Former Dawson employees have

alleged that waste TCE was disposed of at the site by discharging it to the ground surface off a loading dock. The current owner of the property acquired it shortly after Dawson vacated, and has used it for storage in the past. The original building and others added on over time\ are currently leased to the Eagle Claw Fishing Tackle Company. The buildings are used for assembly and distribution of fishing tackle by Laker Fishing Tackle, a subsidiary of Eagle Claw.

3.0 Methods

3.1 Field Procedures

A health and safety briefing was conducted on-site and personnel read and signed the site-specific health and safety plan.

Missouri One-Call was notified of proposed field activities prior to ESP personnel arriving on-site, and all applicable underground utilities were marked.

ESP/HWP personnel calibrated field instruments, including a mobile gas chromatograph, pH, specific conductivity, and temperature meters on-site following manufacturers' specifications.

As specified in the sampling plan, ESP personnel collected grab samples of selected private drinking water wells (and one public well), surface water (from two nearby springs), soil samples from soil borings, indoor ambient air, outdoor ambient air, and subslab vapor samples from areas of concern on-site and target areas on or near the site.

All sample locations and descriptions were noted in a bound field logbook and locations noted on a site map. Groundwater samples collected from private drinking water wells were named sequentially as collected using the prefix DW (e.g. DW01, DW02). Soil boring locations were named sequentially as installed (e.g. SB01, SB02). Discrete soil samples collected from soil boring locations were named using the following format; SBxx-yy', where yy is the depth of the sample in feet below ground surface. Surface water samples were named sequentially as collected using the prefix SWxx. Ambient air samples were named AAxx, indoor air samples IAxx and subslab vapor samples SSxx sequentially as collected. HWP personnel determined the geographic coordinates of all SB, DW, SW, AA, AI and SS sample locations.

All aspects of sampling were performed using standard operating procedures (SOPs) established within the ESP for the collection, preservation, and transport of various media sampled.

3.1.1 Soil Sampling

Soil sampling was conducted using a truck mounted hydraulic push probe. At each sample boring location, 2.125-inch diameter core was collected at 5-foot intervals from the surface to refusal in acetate sleeves using a macro-core sampler. Soil cores were field-logged and photographed. As quickly as possible after exposing the core, a photoionization detector (PID) was used to screen soil along the length of the core for total VOC concentration. PID screening

was performed by punching a hole in the macro-core liners at each half foot interval and placing the screening port in the void space and recording the highest number shown on the PID display. Soil samples were collected for analysis using 5 gram core sampler based on the PID results. The 5-gram sample was then analyzed for TCE and cis-1,2 DCE using the Frog-4000 mobile gas chromatograph/PID system manufactured by Defiant Technologies in accordance with the SOP (MDNR-DEQ-HWP-4000). Based upon PID and Frog-4000 readings additional soil was collected and returned to the laboratory in Jefferson City for additional confirmatory analysis. An additional 5 gram sample and a 2ounce jar were collected with the 5 gram sample used with the Frog-4000. Samples were placed directly into containers with a minimal amount of headspace in the 2 ounce jars to reduce volatilization. The 5 gram lab portion was also frozen with a portable freezer to increase holding times for soil samples.

Initial soil boing locations were selected based on allegations of where TCE was released. Additional boing locations were selected further away to estimate the lateral extent of contamination in the overburden. A total of 9 soil borings were drilled in order to estimate the extent of migration from the alleged point of release. All soil borings were filled with bentonite chips and hydrated with water once sampling was completed. Soil borings were registered with the Missouri Geological Survey Program in Rolla, Missouri.

3.1.2 Water Sampling

Field instruments used during water sample collection, including pH, specific conductivity, and temperature meters, were calibrated on-site per manufacturers' specifications.

3.1.2.1 Surface water sampling

The surface water grab sample was collected by immersing the sample containers directly into a seep/spring that was sampled. Two spring/seep areas were identified during reconnaissance observations and were sampled during this event. One location was named Cullen Spring and the other was an unnamed spring located south and west of Cullen Spring. Care was taken to minimize sediment disturbance during collection.

3.1.2.2 Drinking water well sampling

At each well location, samples were collected from at a point closest to the well head as available. The tap was opened at a high flow for five minutes. Specific conductivity, pH, and temperature were monitored during purging. The well continued to run for an additional three minutes and field measurements were collected again. If all the parameters were considered stable, (pH within 0.2 units, temperature and specific conductivity within +/- 10%) a sample was collected. If water quality parameters were not within stable range then the tap continued to operate for an additional three minutes and this repeated until stabilization occured The samples were labeled, recorded on chain of custody forms and stored on ice until submission to the laboratory for analysis.

3.1.3 Indoor and Ambient Air Sampling

Indoor and ambient air samples were collected at pre-determined locations by the use of 6 Liter SUMMA canisters set with 10 hour time integrated flow controllers. The canisters were placed around breathing zone height (between 4 to 6 feet above floor level). The indoor air samples were collected in the general location of the subslab vapor samples and the ambient air samples were collected in the front and back of the building.

3.1.4 Subslab Vapor Sampling

Subslab vapor samples were collected from beneath the concrete floor in the building. Twelve locations were identified in the building. A 5/8" hole was drilled through the concrete slab and slightly into the subslab base material using a hammer drill. The hole was recessed inside a larger 1-inch countersunk hole to allow for a flush mount sampling port completion. This allowed for collection of additional subslab vapor samples from the same sampling ports in the future if necessary. A Vapor Pin™ sampling port was driven into the hole, the port sealed, and the hole was allowed to equilibrate for a minimum of 2 hours.

Leak testing was conducted on each port immediately following port installation. Ultra-high purity helium was introduced into a shroud surrounding the sampling port until a concentration of ≥60% was achieved inside the shroud as measured with a thermal conductivity helium meter. For a 2 minute period, negative pressure was applied to the sampling port using a 1,000 ml/min pump, and subslab vapor was collected from the subslab space into a Tedlar™ bag. The vapor collected inside the bag was tested for helium. A result of ≤1% helium will demonstrate that the sampling port is sufficiently leak-free for active vapor sampling. All sampling ports were considered leak free. A vapor sample was then collected in a 1L Summa canister with the valve set to collect at flow rate of 100 ml/min. After 9-10 minutes the Summa canister valve was closed and disconnected from the sampling port. The sampling port was capped and the flush mount hole covered with a locking stainless steel cap.

Following completion of subslab vapor sample collection, when it is determined that no additional sampling is necessary, the sampling ports will be removed, and the subslab holes will be patched with epoxy concrete and finished to the original grade to the extent practical.

3.2 Sample Order

Personnel attempted to collect soil samples in accordance with the potential for finding contamination. Personnel first attempted to locate any hazardous material in the soil and then made attempts to delineate the extent of the release once contamination was found. Dedicated or field decontaminated equipment was used so cross contamination was less of a concern as opposed to delineation of the contaminant plume. Water and air samples could not be collected from least to most contaminated since the degree of contamination with these samples was unknown. Dedicated equipment was used with the collection of these samples therefore cross

contamination from sample order collection was not an issue.

3.3 Sample Quantity

A total of 78 samples were collected at this site. 23 soils, 14 subslab vapor, 13 indoor air, 2 ambient air, 17 private drinking water wells, 1 public water well, 2 springs, and 3 trip blank samples were collected during the sampling event. Refer to Table 1, Table 2, and Table 3 for the identity, location, date, and time of each sample collected.

3.4 Chain-of-Custody

All samples received a numbered label and the corresponding number was entered onto a chain-of-custody form indicating the location, date and time of collection, and analytes requested. Samples were properly stored and transported in accordance to standard operating procedures. ESP field personnel maintained custody of the samples until relinquishing them to a sample custodian at the state's environmental laboratory within the Environmental Services Program in Jefferson City for analysis.

3.5 Analyses Requested

All water (private wells, trip blanks, and spring) samples and soil samples were submitted for volatile organics analyses. Ambient and indoor air samples were submitted for TO-15 SIM analysis. Subslabvapor samples were submitted for TO-15 analysis.

4.0 Data Quality

To help ensure precise, accurate, representative, complete, and comparable data were achieved, all field work and analyses were conducted in accordance with the Quality Assurance Project Plan (QAPP) for Pre-Remedial/Pre-Removal and Targeted Brownfields Site Assessments Revision 7, December 7, 2012, and ongoing (MDNR, 2012). Unless otherwise noted in this sampling report, ESP field personnel utilized standard operating procedures established within the ESP for all samples collected.

4.1 Field Methods

Clean disposable nitrile gloves were worn by sampling personnel and clean or field decontaminated equipment was utilized for each separate sample collected to minimize the possibility of cross-contamination.

Field personnel noted all observations, sample locations, descriptions, and methods in a bound field logbook and on field sheets.

All samples were collected in certified-clean containers and preserved in the field as appropriate.

4.2 Field Decontamination

Field decontamination of sampling equipment was accomplished as follows:

- Brushing with stiff-bristle nylon brush to remove visible soil debris;
- Cleaning with Simple Green detergent and further brushing;
- Rinsing with DI water; or alternatively due to large volume required, the Geoprobe tooling was rinsed with plain potable water
- Wiping dry with clean paper towels

Decontaminated equipment was allowed to air dry until used again.

4.3 Field Quality Assurance/Quality Control Samples

4.3.1 Trip blank

Three trip blanks consisting of analyte-free water were prepared in the laboratory, taken to the field, and accompanied samples collected and transported back to the laboratory. The trip blanks received a numbered label, were entered onto the chain-of-custody form, and submitted for volatile organics analyses.

4.3.2 Collocated samples

One collocated indoor air and one subslab vapor grab sample were collected during the sampling event. The collocated sample was collected alongside its true sample using the same technique as for the true sample. The collocated subslab sample was collected by installing a vapor pin within three feet of the original sample pin using the same sample instillation procedures. The collocated indoor air sample was collected next to its true sample. The collocated sample was assigned a unique sample number, was entered onto the chain-of-custody form as a collocated sample and was submitted for the same analytes as its true sample.

4.3.3 Duplicate samples

Two duplicate water samples were collected during the sampling event. The duplicate sample was collected alongside its true sample using the same technique as for the true sample. The duplicate sample was assigned a unique sample number, was entered onto the chain-of-custody form as “blind duplicate”, and was submitted for the same analytes as its true sample

4.3.4 Replicate samples

One replicate soil sample was collected during the sampling event. The replicate sample was collected alongside its true sample using the same technique as for the true sample. The duplicate sample was assigned a unique sample number, was entered onto the chain-of-custody form as “blind replicate”, and was submitted for the same analytes as its true sample

5.0 Investigation Derived Wastes (IDW)

Field personnel returned unused soils to their source immediately after generation or disposed of the soil on site. IDW generated during private drinking well evacuation was allowed to drain onto the ground. Disposable personal protective equipment and disposable sampling equipment were generally handled as solid waste, containerized, and properly disposed.

6.0 Observations

The weather during the sampling event was generally clear to partly cloudy and with temperatures around 70 degrees Fahrenheit on the first two days with a light showers beginning in the afternoon of October 3. Winds were variable but fairly calm and from the west to southwest. On October 4 cloudy conditions and rain set in during the day becoming heavier as the day progressed. Temperatures were around 60 degrees Fahrenheit.

Water grab samples were intended to be collected in soil borings if water was encountered. Soil boring depths ranged from 12 to 17 feet deep and no water was encountered in any of the soil borings. No deviations from the sampling plan were noted in any of the other media sampled with air and water samples collected in accordance to descriptions outlined in the sampling plan.

Please refer to Table 1, Table 2, and Table 3 for observations noted on each sample submitted for laboratory analyses.

7.0 Data Reporting

Please refer to Appendix A for analytical results of samples collected.

Submitted by: Kenneth Hannon

Kenneth A. Hannon
Environmental Specialist
Field Services Unit
Environmental Services Program

Approved by: _____

Eric Sappington
Unit Chief, Field Services Unit
Environmental Services Program

ES:kh

c: Amanda Branson, Environmental Specialist, HWP

TABLES

Dawson Metal Products Camdenton Facility #2 Site
Camdenton, Missouri

Table 1
Dawson metals Site, Camdenton County, Missouri

Soil Sampling Collection Data			
Sample Number	**Date Collected**	**Time Collected**	**Location Collected/Description**
173820	10/3/17	1145	SB-01 at 11.0 to 11.5 ft. depth. Brown sandy soil.
173821	10/3/17	1200	SB-01 at 6.5 to 7.0 ft. depth. Tight red clay.
173822	10/3/17	1214	SB-01 at 0.0 to 0.5 ft. depth. Soft brown clay with rocks.
173823	10/3/17	1415	SB-02 at 3.0 to 3.5 ft. depth. Fractured rock with tight clay.
173824	10/3/17	1430	SB-02 at 9.5 to 10.0 ft. depth. Tight red clay.
173825	10/3/17	1443	SB-02 at 7.5 to 8.0 ft. depth. Tight red clay.
173826	10/3/17	1450	SB-02 at 12.5 to 13.0 ft. depth. Tight red clay.
173827	10/3/17	1541	SB-03 at 6.5 to 7.0 ft. depth. Tight red clay.
173828	10/3/17	1550	SB-03 at 8.5 to 9.0 ft. depth. Tight red clay.
173829	10/3/17	1647	SB-04 at 8.0 to 8.5 ft. depth. Tight red clay.
173830	10/3/17	1700	SB-04 at 16.5 to 17.0 ft. depth. Tight red clay.
173831	10/3/17	1730	SB-05 at 8.0 to 8.5 ft. depth. Tight red clay.
173832	10/3/17	1741	SB-05 at 11.5 to 12.0 ft. depth. Tight red clay.
173622	10/4/17	0845	SB-06 at 11.0 to 11.5 ft. depth. Tight red clay.
173623	10/4/17	0900	SB-06 at 16.5 to 17.0 ft. depth. Tight red clay.
172890	10/4/17	0942	SB-07 at 0.5 to 1.0 ft. depth. Tight to loose brown clay.
172892	10/4/17	0955	SB-07 at 5.5 to 6.0 ft. depth. Tight red clay.
173620	10/4/17	1012	SB-07 at 12.5 to 13.0ft. depth. Tight red clay.
173621	10/4/17	1012	Duplicate of 173620.
173619	10/4/17	1047	SB-08 at 13.0 to 13.5 ft. depth. Tight red clay.
173618	10/4/17	1100	SB-08 at 10.5 to 11.0 ft. depth. Tight red clay.
173617	10/4/17	1323	SB-09 at 6.0 to 6.5 ft. depth. Medium red/gray clay.
173616	10/4/17	1334	SB09 at 13.5 to 14.0 ft. depth. Tight red clay.

Table 2
Dawson metals Site, Camdenton County, Missouri

Water Sampling Collection Data			
Sample Number	**Date Collected**	**Time Collected**	**Location Collected/Description**
173807	10/2/17	0752	Trip Blank.
173808	10/2/17	0847	DW-01 at loc. ID # 113. Front of the barn, right side.
173809	10/2/17	0913	DW-02 at loc. ID # 111. Spigot prior to water softener.
173810	10/2/17	0935	DW-03 at loc. ID # 103. Spigot on the back of the house.
173811	10/2/17	1006	DW-04 at loc. ID # 114. Spigot on the front corner of the house.
173812	10/2/17	1035	DW-05 at loc. ID # 115. Spigot behind the house.
173813	10/2/17	1050	DW-06 at loc. ID # 117. Spigot on the front of the house.
173814	10/2/17	1108	DW-07 at loc. ID # 118. Spigot on the side of the house facing the road.
173815	10/2/17	1145	DW-08 at loc. ID # 108. Spigot in the house.
173816	10/2/17	1200	DW-09 at loc. ID # 124. Spigot at the well head.
173817	10/2/17	1327	DW-10 from spigot at Camdenton Public Well #4.
173818	10/2/17	1327	Duplicate of 173817.
173819	10/2/17	1847	DW-11 at loc. ID # 116. Downstairs bathroom sink, location nearest the well head.
173797	10/2/17	0753	Trip Blank.
173798	10/2/17	0848	Spigot at 697 Ballpark Road.
173799	10/2/17	0918	Spigot on the back of the house at 10 Hyd-a-way.
173800	10/2/17	0945	Well house at Belmont duplex.
173801	10/2/17	0945	Duplicate of 173800.
173802	10/2/17	1025	Spigot on the side of the well house at 1197 Ballpark Road.
173803	10/2/17	1053	Spigot on the front of the house at 1207 Ballpark Road.
173804	10/2/17	1140	Spigot in the garage at 139 Banner Street.
173805	10/2/17	1405	Unnamed spring near remains of an old building.
173806	10/2/17	1435	Cullen spring.
173837	10/4/17	1411	Trip Blank.
173838	10/4/17	1427	DW-12 at loc. ID # 126. Spigot in the front of the house.

*unless noted otherwise all samples were considered clear, colorless and odorless.

Table 3
Dawson metals Site, Camdenton County, Missouri

Air Sampling Collection Data			
Sample Number	**Date Collected**	**Time Collected**	**Location Collected/Description**
173842	10/4/17	0912	SS-11 breakroom can 1L1629.
173843	10/4/17	0913	SS-12 copy room/office can 1L2817.
173844	10/4/17	0934	SS-01 room1 can 1L3049.
173845	10/4/17	0934	SS-13 room 1can 1L2743.
173846	10/4/17	0957	SS-02 room 1 can 1L2830
173847	10/4/17	0957	SS-03, collocated with SS-02 room 1 can 1L2481.
173848	10/4/17	0955	SS-14 room 1 can 1L1755.
173849	10/4/17	1015	SS-04 room 2 can 1L1566.
173850	10/4/17	10334	SS-05 room 3 can 1L1826.
173851	10/4/17	1039	SS-06 room 5 can 1L1843.
173852	10/4/17	1058	SS-07 room 6 can 1L1839.
173853	10/4/17	1115	SS-08 room 7 can 1L1775.
173854	10/4/17	1114	SS-09 room 7can 1L8035.
173855	10/4/17	1136	SS-10 room 8 can 1L2191.
173782	10/2/17	1525	IA-01 room 1 west end can 6L1642.
173783	10/2/17	1525	IA-01 room 1 collocated with 173782. Can 6L1568.
173784	10/2/17	1529	IA-02 room 1 shelving can 6L0622.
173785	10/2/17	1534	IA-03 room 2 middle shelf can 6L0540.
173786	10/2/17	1536	IA-04 room 3 middle shelf can 6L1527.
173787	10/2/17	1546	IA-05 room 4 can 6L0070.
173788	10/2/17	1546	IA-06 room 5 middle of room can 6L1242.
173789	10/2/17	1548	IA-07 room 6 work station shelf can 6L0742.
173790	10/2/17	1549	IA-08 room 6 SE corner can 6L1534.
173791	10/2/17	1551	IA-09 room 7 work shelf can 6L1051.
173792	10/2/17	1554	IA 10 unisex bathroom can 6L0465.
173793	10/2/17	1555	IA-11 break room under TV can 6L0864.
173794	10/2/17	1556	IA-12 front room filing cabinet can 6L000001886.
173795	10/2/17	1558	AA-01 back of building can 6L1341.
173796	10/2/17	1618	AA-02 front of building in a tree can 6L1263.

APPENDIX A

Analytical Results

Dawson Metal Products Camdenton Facility #2 Site
Camdenton, Missouri

APPENDIX B

Chain of Custody/Field Notes
Dawson Metal Products Camdenton Facility #2 Site
Camdenton, Missouri

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery

____ Tape sealed and initialed — Total No. Of Containers: 8

____ Shipped — Carrier: ____

X Hand Delivered — By: ____

Collector's Name: Caleb Troutt (Please Print)

Affiliation: (circle one) KCRO NERO SERO SLRO SWRO WPP DGLS HWP ESP MoDOT MDC DHSS Other:

LAB USE ONLY!

Laboratory ID: 171003020 171003021 171003022 171003023

Location: 821

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (circle one)	Field Parameters (include units)		Matrix (circle one)	Container Type	Preservative Type	Number of Containers
173797 (Sample A)	Date: 10/2/2017	VOC (method 524.2)	None	D.O.		Water	40 mL AG	HCl	2
For Lab Use Only AD08868	Time: 0753		Cl_2	Flow		Soil			
			UV	pH		Organic			
			Ozone	Cond.		Sludge			
			Other:	Temp.		Other:			
				Other:					
173798 (Sample B)	Date: 10/2/2017	VOC (method 524.2)	None	D.O.	5.49 mg/l	Water	40 mL AG	HCl	2
For Lab Use Only AD08869	Time: 0848		Cl_2	Flow		Soil			
			UV	pH	6.96	Organic			
			Ozone	Cond.	586 µs	Sludge			
			Other:	Temp.	15.3 C	Other:			
				Other:					
173799 (Sample C)	Date: 10/2/2017	VOC (method 524.2)	None	D.O.	6.55 mg/l	Water	40 mL AG	HCl	2
For Lab Use Only AD08870	Time: 0918		Cl_2	Flow		Soil			
			UV	pH	7.1	Organic			
			Ozone	Cond.	639 µs	Sludge			
			Other:	Temp.	19.1 c	Other:			
				Other:					
173800 (Sample D)	Date: 10/2/2017	VOC (method 524.2)	None	D.O.	4.76 mg/l	Water	40 mL AG	HCl	2
For Lab Use Only AD08871	Time: 0945		Cl_2	Flow		Soil			
			UV	pH	7.17	Organic			
			Ozone	Cond.	527 µs	Sludge			
			Other:	Temp.	17.5 C	Other:			
				Other:					

Relinquished By: Caleb Troutt	Received By: [signature]	Date: 10/2/17	Time: 1645
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A	LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	~~DW-14~~ DW-13
Facility ID:	Site/Study Name:	Dawson metals site	County:	Camden	Sample Event Type: (circle one)	Sample Type: (circle one)
Sample Comment (where and how the sample was collected): Sample 173797 is a trip blank	Grab	Composite	Modified	Other:	Bypass/SSO Complaint Emergency Response Inspection **Investigation** Monitoring Special Project	Air / Soil Container / Spill Discharge / Storm Water Groundwater / Surface Water Organic / Wipes Sediment / Rinsate Water Sludge Drinking Water Supply
GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP		

Sample B	LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	~~DW-14~~ DW-13
Facility ID:	Site/Study Name:	Dawson metals site	County:	Camden	Sample Event Type: (circle one)	Sample Type: (circle one)
Sample Comment (where and how the sample was collected): Sample # 173798 was taken from spigot. 697 Ballpark road	Grab	Composite	Modified	Other:	Bypass/SSO Complaint Emergency Response Inspection **Investigation** Monitoring Special Project	Air / Soil Container / Spill Discharge / Storm Water Groundwater / Surface Water Organic / Wipes Sediment Sludge Drinking Water Supply
GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP		

Sample C	LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	DW-14
Facility ID:	Site/Study Name:	Dawson metals site	County:	Camden	Sample Event Type: (circle one)	Sample Type: (circle one)
Sample Comment (where and how the sample was collected): Sample # 173799 was taken from spigot on back of house at 10 Hyd-a-way	Grab	Composite	Modified	Other:	Bypass/SSO Complaint Emergency Response Inspection **Investigation** Monitoring Special Project	Air / Soil Container / Spill Discharge / Storm Water Groundwater / Surface Water Organic / Wipes Sediment Sludge Drinking Water Supply
GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP		

Sample D	LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	DW-15
Facility ID:	Site/Study Name:	Dawson metals site	County:	Camden	Sample Event Type: (circle one)	Sample Type: (circle one)
Sample Comment (where and how the sample was collected): Sample # 173800 was taken from wellhouse at Belmont duplex.	Grab	Composite	Modified	Other:	Bypass/SSO Complaint Emergency Response Inspection **Investigation** Monitoring Special Project	Air / Soil Container / Spill Discharge / Storm Water Groundwater / Surface Water Organic / Wipes Sediment Sludge Drinking Water Supply
GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP		

Remarks: 3 cc Please Expedite. Seperate each Sample as own order

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery

____ Tape sealed and initialed

____ Shipped

X Hand Delivered

Total No. Of Containers: 8

Carrier: _____

By: _____

Collector's Name: Caleb Troutt (Please Print)

Affiliation: (circle one) KCRO NERO SERO SLRO SWRO WPP DGLS HWP ESP MoDOT MDC DHSS Other:

LAB USE ONLY!

Laboratory ID: 171003016, 171003017, 171003018, 171003019

Location: 821

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (circle one)	Field Parameters (include units)		Matrix (circle one)	Container Type	Preservative Type	Number of Containers
173801 (Sample A)	Date: 10/2/2017	VOC (method 524.2)	None	D.O.		Water	40mLAG	HCl	3
For Lab Use Only AD08864	Time: 2400		Cl_2	Flow		Soil			
			UV	pH		Organic			
			Ozone	Cond.		Sludge			
			Other:	Temp.		Other:			
				Other:					
173802 (Sample B)	Date: 10/2/2017	VOC (method 524.2)	None	D.O.	5.73 mg/l	Water	40mLAG	HCl	3
For Lab Use Only AD08865	Time: 1025		Cl_2	Flow		Soil			
			UV	pH	7.11	Organic			
			Ozone	Cond.	703 µs	Sludge			
			Other:	Temp.	15.5 C	Other:			
				Other:					
173803 (Sample C)	Date: 10/2/2017	VOC (method 524.2)	None	D.O.	5.38 mg/l	Water	40mLAG	HCl	3
For Lab Use Only AD08866	Time: 1053		Cl_2	Flow		Soil			
			UV	pH	7.22	Organic			
			Ozone	Cond.	574 µs	Sludge			
			Other:	Temp.	16.5 c	Other:			
				Other:					
173804 (Sample D)	Date: 10/2/2017	VOC (method 524.2)	None	D.O.	5.87 mg/l	Water	40mLAG	HCl	3
For Lab Use Only AD08867	Time: 1140		Cl_2	Flow		Soil			
			UV	pH	7.16	Organic			
			Ozone	Cond.	560 µs	Sludge			
			Other:	Temp.	16.7 C	Other:			
				Other:					

Relinquished By: Caleb Troutt	Received By: [illegible]	Date: 10/2/17	Time: 1645
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	
Facility ID:	Site/Study Name: Dawson metals site	County: Camden			

Sample Comment (where and how the sample was collected): **Grab** Composite Modified Other:
Sample 173801 is a blind duplicate

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP

Sample Event Type: (circle one)
Bypass/SSO, Complaint, Emergency Response, Inspection, **Investigation**, Monitoring, Special Project

Sample Type: (circle one)
Air, Soil, Container, Spill, Discharge, Storm Water, Groundwater, Surface Water, Organic, Wipes, Sediment, Rinsate Water, Sludge, Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	DW-16
Facility ID:	Site/Study Name: Dawson metals site	County: Camden			

Sample Comment (where and how the sample was collected): **Grab** Composite Modified Other:
Sample # 173802 was taken from spigot on side of well house at 1197 Ballpark road.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP

Sample Event Type: (circle one)
Bypass/SSO, Complaint, Emergency Response, Inspection, **Investigation**, Monitoring, Special Project

Sample Type: (circle one)
Air, Soil, Container, Spill, Discharge, Storm Water, Groundwater, Surface Water, Organic, Wipes, Sediment, Sludge, Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	DW-17
Facility ID:	Site/Study Name: Dawson metals site	County: Camden			

Sample Comment (where and how the sample was collected): **Grab** Composite Modified Other:
Sample # 173803 was taken from from spigot on front of house at 1207 Ballpark Road.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP

Sample Event Type: (circle one)
Bypass/SSO, Complaint, Emergency Response, Inspection, **Investigation**, Monitoring, Special Project

Sample Type: (circle one)
Air, Soil, Container, Spill, Discharge, Storm Water, Groundwater, Surface Water, Organic, Wipes, Sediment, Sludge, Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	DW-18
Facility ID:	Site/Study Name: Dawson metals site	County: Camden			

Sample Comment (where and how the sample was collected): **Grab** Composite Modified Other:
Sample # 173804 was taken from spigot in garage at 139 banner street.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP

Sample Event Type: (circle one)
Bypass/SSO, Complaint, Emergency Response, Inspection, **Investigation**, Monitoring, Special Project

Sample Type: (circle one)
Air, Soil, Container, Spill, Discharge, Storm Water, Groundwater, Surface Water, Organic, Wipes, Sediment, Sludge, Drinking Water Supply

Remarks: Jol Please Expedite. Seperate each Sample as own order

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery

____ Tape sealed and initialed — Total No. Of Containers: 8

____ Shipped — Carrier: ____

X Hand Delivered — By: ____

Collector's Name: Caleb Troutt
(Please Print)

Affiliation: *(circle one)* KCRO NERO SERO SLRO SWRO WPP DGLS HWP ESP MoDOT MDC DHSS Other:

LAB USE ONLY!

Laboratory ID: 17100302A, 17100302S

Location: 021

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (circle one)	Field Parameters (include units)		Matrix (circle one)	Container Type	Preservative Type	Number of Containers
173805 (Sample A)	Date: 10/2/2017	VOC (method 524.2)	None, Cl_2, UV, Ozone, Other:	D.O. 5.84 mg/l; Flow; pH 7.23; Cond. 642 µs; Temp. 18.0 C; Other:		Water, Soil, Organic, Sludge, Other:	40 mL AG	HCl	2
For Lab Use Only AD08872	Time: 1405								
173806 (Sample B)	Date: 10/2/2017	VOC (method 524.2)	None, Cl_2, UV, Ozone, Other:	D.O. 8.55 mg/l; Flow; pH 7.01; Cond. 465.7 µs; Temp. 14.8 C; Other:		Water, Soil, Organic, Sludge, Other:	40 mL AG	HCl	2
For Lab Use Only AD08873	Time: 1435								
(Sample C)	Date:		None, Cl_2, UV, Ozone, Other:	D.O.; Flow; pH; Cond.; Temp.; Other:		Water, Soil, Organic, Sludge, Other:			
For Lab Use Only	Time:								
(Sample D)	Date:		None, Cl_2, UV, Ozone, Other:	D.O.; Flow; pH; Cond.; Temp.; Other:		Water, Soil, Organic, Sludge, Other:			
For Lab Use Only	Time:								

Relinquished By: Caleb Troutt	Received By: [signature]	Date: 10/2/17	Time: 1645
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES

FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	SW-01
Facility ID:	Site/Study Name: Dawson metals site		County: Camden		

Sample Comment (where and how the sample was collected): **Grab** Composite Modified Other:

Sample 173805 was taken from unnamed spring near remains of old building.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP

Sample Event Type: (circle one)
Bypass/SSO, Complaint, Emergency Response, Inspection, **Investigation**, Monitoring, Special Project

Sample Type: (circle one)
Air, Soil, Container, Spill, Discharge, Storm Water, Groundwater, **Surface Water**, Organic, Wipes, Sediment, Rinsate Water, Sludge, Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:	SW-02
Facility ID:	Site/Study Name: Dawson metals site		County: Camden		

Sample Comment (where and how the sample was collected): **Grab** Composite Modified Other:

Sample # 173806 was taken from Cullen spring.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP

Sample Event Type: (circle one)
Bypass/SSO, Complaint, Emergency Response, Inspection, **Investigation**, Monitoring, Special Project

Sample Type: (circle one)
Air, Soil, Container, Spill, Discharge, Storm Water, Groundwater, **Surface Water**, Organic, Wipes, Sediment, Sludge, Drinking Water Supply

Sample C

LDPR:		Job Code:		Sample Reference ID:	
Facility ID:	Site/Study Name:		County:		

Sample Comment (where and how the sample was collected): **Grab** Composite Modified Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP

Sample Event Type: (circle one)
Bypass/SSO, Complaint, Emergency Response, Inspection, **Investigation**, Monitoring, Special Project

Sample Type: (circle one)
Air, Soil, Container, Spill, Discharge, Storm Water, Groundwater, Surface Water, Organic, Wipes, Sediment, Sludge, **Drinking Water Supply**

Sample D

LDPR:		Job Code:		Sample Reference ID:	DW-18
Facility ID:	Site/Study Name:		County:		

Sample Comment (where and how the sample was collected): **Grab** Composite Modified Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(circle one) EPE (meters) PDOP

Sample Event Type: (circle one)
Bypass/SSO, Complaint, Emergency Response, Inspection, **Investigation**, Monitoring, Special Project

Sample Type: (circle one)
Air, Soil, Container, Spill, Discharge, Storm Water, Groundwater, Surface Water, Organic, Wipes, Sediment, Sludge, **Drinking Water Supply**

Remarks: J-C Please expedite. Separate each sample as own order

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 8
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171003030, 171003031, 171003032, 171003033
Location: B21

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type	Field Parameters (include units)	Matrix	Container Type	Preservative Type	Number of Containers
173807 (Sample A)	Date: 10/2/17	VOC via method 524.2	(check one) ☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mLAG	HCl	2
For Lab Use Only AD08878	Time: 0752							
173812 (Sample B)	Date: 10/2/17	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 6.71 Cond. 951 µs Temp. 17.2°C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mLAG	HCl	2
For Lab Use Only AD08879	Time: 1035							
173813 (Sample C)	Date: 10/2/17	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 6.65 Cond. 1014 µs Temp. 19.0°C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mLAG	HCl	2
For Lab Use Only AD08880	Time: 1050							
173814 (Sample D)	Date: 10/2/17	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 6.77 Cond. 814 µs Temp. 17.7°C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mLAG	HCl	2
For Lab Use Only AD08881	Time: 1108							

Relinquished By: Kenneth Hannon	Received By:	Date: 10/2/17	Time: 1500
Relinquished By:	Received By:	Date: 10/2/17	Time: 1610
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173807, Trip Blank.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☒ Drinking Water Supply ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173812, DW-05 at Loc ID# 115 spigot behind the house.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☒ Drinking Water Supply ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173813, DW-06 at Loc ID# 117 spigot on front of house.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☒ Drinking Water Supply ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173814, DW-07 at Loc ID# 118 spigot on the side of the house facing the Road.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☒ Drinking Water Supply ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge

Remarks: gOC

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 8
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 17100302[illegible] 17100303[illegible] 17100303[illegible] 17100303[illegible]
Location: B21

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173B08 (Sample A)	Date: 10/2/17	VOC via method 524.2	(check one) ☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 6.56 Cond. 951 µs Temp. 17.0 °C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mLAG	HCl	2
For Lab Use Only AD08874	Time: 0847							
173B09 (Sample B)	Date: 10/2/17	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 6.92 Cond. 799 µs Temp. 17.5 °C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mLAG	HCl	2
For Lab Use Only AD08875	Time: 0913							
173B10 (Sample C)	Date: 10/2/17	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 7.05 Cond. 739 µs Temp. 18.9 °C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mLAG	HCl	2
For Lab Use Only AD08876	Time: 0935							
173B11 (Sample D)	Date: 10/2/17	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 6.75 Cond. 1388 µs Temp. 17.2 °C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mLAG	HCl	2
For Lab Use Only AD08877	Time: 1006							

Relinquished By: Kenneth Hannon	Received By:	Date: 10/2/17	Time: 1500
Relinquished By:	Received By:	Date: 10/2/17	Time: 1610
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173808, DW-01 at Loc. ID# 113 Front of barn at right side.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☒ Drinking Water Supply

Sample B

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173809, DW-02 at Loc ID# 111 spigot prior to water softner.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☒ Drinking Water Supply

Sample C

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173810, DW-03 at Loc ID# 103 spigot on back of house.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☒ Drinking Water Supply

Sample D

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173811 DW-04 at Loc ID# 114 spigot on front corner of the house.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☒ Drinking Water Supply

Remarks: 8°C

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers:
Carrier:
By:

Collector's Name: Kenneth Hannon (Please Print)

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171003034, 171003035, 171003036, 171003037
Location: B2

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173815 (Sample A) For Lab Use Only: AD08882	Date: 10/2/17 Time: 1145	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 7.03 Cond. 657 µs Temp. 16.5 °C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mL AG	HCl	2
173816 (Sample B) For Lab Use Only: AD08883	Date: 10/2/17 Time: 1200	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 6.68 Cond. 837 µs Temp. 16.9 °C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mL AG	HCl	2
173817 (Sample C) For Lab Use Only: AD08884	Date: 10/2/17 Time: 1327	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 7.13 Cond. 659 µs Temp. 17.7 °C Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mL AG	HCl	2
173818 (Sample D) For Lab Use Only: AD08885	Date: 10/2/17 Time: —	VOC via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☑ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40mL AG	HCl	2

Relinquished By: Kenneth Hannon	Received By:	Date: 10/2/17	Time: 1500
Relinquished By:	Received By:	Date: 10/2/17	Time: 1610
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173815, DW-08 at Loc ID # 108 spigot in well house.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☒ Drinking Water Supply ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173816, DW-09 at Loc ID # 124 spigot at well head.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☒ Drinking Water Supply ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173817, DW-10 at ~~Loc ID~~ (K) # Camdenton Public well #4.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☒ Drinking Water Supply ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173818, blind duplicate.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☒ Drinking Water Supply ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge

Remarks: 8cc

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 7
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP
☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171003038
Location: B21

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173819 (Sample A)	Date: 10/2/17	VOC via method 524.2	(check one) ☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 6.73 Cond. 1432 µs Temp. 17.6°C Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	Q40	HCL	7
For Lab Use Only A008886	Time: 1847							
(Sample B)	Date:		☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							
(Sample C)	Date:		☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							
(Sample D)	Date:		☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							

Relinquished By: Kenneth Hannon	Received By:	Date: 10/3/17	Time: 0753
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173819, DW-11 Loc ID # 116 Downstairs bathroom sink, spigot nearest the well head.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☒ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Remarks:

Expedited turnaround on this sample 10 C

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers:
Carrier:
By:

Collector's Name: Kenneth Hannon
(Please Print)

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP
☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171006006
Location: B1

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173837 (Sample A)	Date: 10/4/17	VOCs via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☒ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40MLAG	HCL	2
For Lab Use Only: AD08987	Time: 1411							
173838 (Sample B)	Date: 10/4/17	VOCs via method 524.2	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH 6.47 Cond. 893 µs Temp. 15.6 °C. Other:	☒ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:	40MLAG	HCL	2
For Lab Use Only: AD08988	Time: 1427							
(Sample C)	Date:		☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							
(Sample D)	Date:		☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							

Relinquished By: Kenneth Hannon	Received By: K. Rustler	Date: 10-5-17	Time: 8:53
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Trip Blank

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☒ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173838, DW-12 at Loc ID #126 front house spigot.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☒ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Remarks:

Expedited turnaround on these samples (8°C) (WITH IN 24 HRS)

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 4
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171006007
Location:

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173782 (Sample A)	Date: 10/2/2017	TO-15 SIM	(check one) ☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HEAP	1
For Lab Use Only AD08989	Time: 1525							
173783 (Sample B)	Date: 10/2/2017	TO-15 SIM	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HEAP	1
For Lab Use Only AD08990	Time: 1525							
173784 (Sample C)	Date: 10/2/2017	TO-15 SIM	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HEAP	1
For Lab Use Only AD08991	Time: 1529							
173785 (Sample D)	Date: 10/2/2017	TO-15 SIM	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HEAP	1
For Lab Use Only AD08992	Time: 1534							

Relinquished By: Kenneth Hannon	Received By: Micah Smith	Date: 10/5/17	Time: 1600
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-01 #173782 Room 1 west end, can # 6L1642 Start PSI=30 end PSI=5.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-01 # 173783 Room 1 co-located, can # 6L156B Start PSI=26.0 end PSI=3.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-02 #173784, Room 1 Shelving, can # 6L0622 start PSI=28.0 end PSI=7.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-03 #173785, Room 2 middle shelf, can # 6L0540 start PSI=29.5 end PSI=5.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Remarks:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- [ ] Tape sealed and initialed
- [ ] Shipped
- [x] Hand Delivered

Total No. Of Containers: 4
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: [ ] KCRO [ ] NERO [ ] SERO [ ] SLRO [ ] SWRO [ ] WPP [ ] MGS [ ] HWP [x] ESP [ ] MoDOT [ ] MDC [ ] DHSS [ ] Other:

LAB USE ONLY!
Laboratory ID: 171006007
Location:

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173786 (Sample A)	Date: 10/2/2017	TO-15 SIM	(check one) [x] None [ ] Chlorine [ ] UV [ ] Ozone [ ] Other:	D.O. Flow pH Cond. Temp. Other:	[ ] Water [ ] Soil [ ] Organic [ ] Sludge [x] Other:	SUMA	heat	1
For Lab Use Only AD08993	Time: 1536							
173787 (Sample B)	Date: 10/2/2017	TO-15 SIM	[x] None [ ] Chlorine [ ] UV [ ] Ozone [ ] Other:	D.O. Flow pH Cond. Temp. Other:	[ ] Water [ ] Soil [ ] Organic [ ] Sludge [x] Other:	SUMA	heat	1
For Lab Use Only AD08994	Time: 1543							
173788 (Sample C)	Date: 10/2/2017	TO-15 SIM	[x] None [ ] Chlorine [ ] UV [ ] Ozone [ ] Other:	D.O. Flow pH Cond. Temp. Other:	[ ] Water [ ] Soil [ ] Organic [ ] Sludge [x] Other:	SUMA	heat	1
For Lab Use Only AD08995	Time: 1546							
173789 (Sample D)	Date: 10/2/2017	TO-15 SIM	[x] None [ ] Chlorine [ ] UV [ ] Ozone [ ] Other:	D.O. Flow pH Cond. Temp. Other:	[ ] Water [ ] Soil [ ] Organic [ ] Sludge [x] Other:	SUMA	heat	1
For Lab Use Only AD08996	Time: 1548							

Relinquished By: Kenneth Hannon	Received By: Micah Smith	Date: 10/5/17	Time: 1600
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-04 # 173786 Room 3 (KH) middle Shelf, can # 6L1527 start PSI = 29.0 end PSI = 5.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample B

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-05 #173787 Room 4, can # 6L0070 start PSI = 30.0 end PSI = 7.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample C

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-06 # 173788 Room 5 middle of room, can # 6L 1242 start PSI = 30.0 end PSI = 6.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample D

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-07 #173789 Room 6 workstation shelf, can #6L0742 start PSI = 28.0 end PSI = 6.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Remarks:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 4
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171006007
Location:

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173790 (Sample A)	Date: 10/2/2017	TO-15 SIM	(check one) ☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HCl	1
For Lab Use Only AD08997	Time: 1549							
173791 (Sample B)	Date: 10/2/2017	TO-15 SIM	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HCl	1
For Lab Use Only AD08998	Time: 1551							
173792 (Sample C)	Date: 10/2/2017	TO-15 SIM	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HCl	1
For Lab Use Only AD08999	Time: 1554							
173793 (Sample D)	Date: 10/2/2017	TO-15 SIM	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HCl	1
For Lab Use Only AD09000	Time: 1555							

Relinquished By: Kenneth Hannon	Received By: Micah Litt	Date: 10/5/17	Time: 1600
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-08 #173790 Room 6 SE corner, can # 6L1534 start PSI=28.0 end PSI=5.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample B

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-09 #173791 Room 7 workshelf 6L1051 start PSI=30.0 end PSI=6.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample C

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-10 #173792 (ICI) ~~Room~~ unisex bathroom 6L0465 start PSI=30.0 end PSI=9.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample D

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

IA-11 # 173793 break room under TV, can # 6L0864 start PSI = 30.0 end PSI=6

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Remarks:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 3
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 17100607
Location:

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173794 (Sample A)	Date: 10/2/2017	TO-15 SIM	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	NAP	1
For Lab Use Only: AD09001	Time: 1556							
173795 (Sample B)	Date: 10/2/2017	TO-15 SIM	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	NAP	1
For Lab Use Only: AD09002	Time: 1558							
173796 (Sample C)	Date: 10/2/2017	TO-15 SIM	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	NAP	1
For Lab Use Only: AD09003	Time: 1618							
(Sample D)	Date: ~~10/2/2017~~	~~TO-15 SIM~~	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	NAP	1
For Lab Use Only:	Time:							

Relinquished By: Kenneth Hannon	Received By: Mark Smith	Date: 10/5/17	Time: 1600
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other: 30.0

IA-12 #173794 front room filing cabinet, can #600 01886 start PSI = ~~3.0~~ end PSI = 9.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
- ☐ Bypass/SSO
- ☐ Complaint
- ☐ Emergency Response
- ☐ Inspection
- ☑ Investigation
- ☐ Monitoring
- ☐ Special Project

Sample Type: *(check one)*
- ☒ Air
- ☐ Container
- ☐ QA/QC
- ☐ Groundwater
- ☐ Organic
- ☐ Sediment
- ☐ Sludge
- ☐ Soil
- ☐ Spill
- ☐ Wipes
- ☐ Storm Water
- ☐ Surface Water
- ☐ Discharge
- ☐ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

AA-01 #173795 ~~IA-13~~ Back of building can #6L1341 start PSI = 29.0 end PSI = 5.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
- ☐ Bypass/SSO
- ☐ Complaint
- ☐ Emergency Response
- ☐ Inspection
- ☑ Investigation
- ☐ Monitoring
- ☐ Special Project

Sample Type: *(check one)*
- ☒ Air
- ☐ Container
- ☐ QA/QC
- ☐ Groundwater
- ☐ Organic
- ☐ Sediment
- ☐ Sludge
- ☐ Soil
- ☐ Spill
- ☐ Wipes
- ☐ Storm Water
- ☐ Surface Water
- ☐ Discharge
- ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

AA-02 #173796 Front building in a tree can #6L1263 start PSI = 30.0 end PSI = 10.0

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
- ☐ Bypass/SSO
- ☐ Complaint
- ☐ Emergency Response
- ☐ Inspection
- ☑ Investigation
- ☐ Monitoring
- ☐ Special Project

Sample Type: *(check one)*
- ☒ Air
- ☐ Container
- ☐ QA/QC
- ☐ Groundwater
- ☐ Organic
- ☐ Sediment
- ☐ Sludge
- ☐ Soil
- ☐ Spill
- ☐ Wipes
- ☐ Storm Water
- ☐ Surface Water
- ☐ Discharge
- ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
- ☐ Bypass/SSO
- ☐ Complaint
- ☐ Emergency Response
- ☐ Inspection
- ☑ Investigation
- ☐ Monitoring
- ☐ Special Project

Sample Type: *(check one)*
- ☐ Air
- ☐ Container
- ☐ QA/QC
- ☐ Groundwater
- ☐ Organic
- ☐ Sediment
- ☐ Sludge
- ☐ Soil
- ☐ Spill
- ☐ Wipes
- ☐ Storm Water
- ☐ Surface Water
- ☐ Discharge
- ☐ Drinking Water Supply

Remarks:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 4
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon / Sean Counihan

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 17100608
Location:

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type	Field Parameters (include units)	Matrix	Container Type	Preservative Type	Number of Containers
173842 (Sample A)	Date: 10/4/17	TO-15	(check one) ☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HNO3	1
For Lab Use Only AD09004	Time: 0912							
173843 (Sample B)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HNO3	1
For Lab Use Only AD09005	Time: 0913							
173844 (Sample C)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HNO3	1
For Lab Use Only AD09006	Time: 0934							
173845 (Sample D)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HNO3	1
For Lab Use Only AD09007	Time: 0934							

Relinquished By: Sean Counihan	Received By: Ken Hannon	Date: 10/5/17	Time: 0730
Relinquished By: Ken Hannon	Received By: Micah Pitt	Date: 10/5/17	Time: 1600
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173842 Breakroom, SS 11

Can # JL1629 start pressure = 27 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample B

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173843 Copy room/office, SS 12

Can # JL2817 start pressure = 27.5 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample C

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173844, Room 1, SS 1

Can # 3049 start pressure = 28 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample D

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173845 Room 1, SS 13

Can # JL2743 start pressure = 30 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: (check one)
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: (check one)
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Remarks:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 4
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon / Sean Cunihan

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171006008
Location:

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173846 (Sample A)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	NAH	1
For Lab Use Only AD09008	Time: 0957							
173847 (Sample B)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	NAH	1
For Lab Use Only AD09009	Time: 0957							
173848 (Sample C)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	NAH	1
For Lab Use Only AD09010	Time: 0955							
173849 (Sample D)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	NAH	1
For Lab Use Only AD09011	Time: 1015							

Relinquished By:	Received By: Ken Hannon	Date: 10/5/17	Time: 0730
Relinquished By: Ken Hannon	Received By:	Date: 10/5/17	Time: 1600
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173846 Room 1, SS2

Can # 1L2830, start pressure=30 - end pressure=6

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173847, Room 1, SS3 - Co-located w/ SS2

Can # 1L2488, start pressure = 30 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173848, Room 1, SS14

Can # 1L1755, start pressure = 28 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173849 Room 2, SS4

Can # 1L1546, Start pressure = 29 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☒ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Remarks:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 4
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon / Sean Counihan

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171006008
Location:

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173850 (Sample A)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HCl	1
For Lab Use Only: AD09012	Time: 1034							
173851 (Sample B)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HCl	1
For Lab Use Only: AD09013	Time: 1039							
173852 (Sample C)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:			
For Lab Use Only: AD09014	Time: 1058							
173853 (Sample D)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:			
For Lab Use Only: AD09015	Time: 1115							

Relinquished By:	Received By: Ken Hannon	Date: 10/5/17	Time: 0730
Relinquished By: Ken Hannon	Received By:	Date: 10/5/17	Time: 1600
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173850 Room 3, 555

Can # 1L1826 Start pressure = 30 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173851, Room 5, 556

Can # 1L1843 Start pressure = 30 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173852 Room 6, 557

Can # 1L1839 Start pressure = 30 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173853 Room 7, 558

Can # 1L1755 Start pressure = 28 - end pressure 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Remarks:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 2
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon / Sean Counihan

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 1710060008
Location:

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173854 (Sample A)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HgCl2	1
For Lab Use Only: AD09016	Time: 1114							
173855 (Sample B)	Date: 10/4/17	TO-15	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☑ Other:	SUMA	HgCl2	1
For Lab Use Only: AD09017	Time: 1130							
(Sample C)	Date:		☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							
(Sample D)	Date:		☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☐ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							

Relinquished By: [signature]	Received By: Ken Hannon	Date: 10/5/17	Time: 0730
Relinquished By: Ken Hannon	Received By: [signature]	Date: 10/5/17	Time: 1600
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173854, Room 9, SS9 (End)
Can # 168035 IL1795, start pressure = 28 - 26.5 end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

Sample # 173855, Room 8, SS10
Can # 2191 Start pressure = 30 - end pressure = 4

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Container ☐ QA/QC ☐ Groundwater ☐ Organic ☐ Sediment ☐ Sludge ☐ Soil ☐ Spill ☐ Wipes ☐ Storm Water ☐ Surface Water ☐ Discharge ☐ Drinking Water Supply

Remarks:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 8
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP
☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171006005
Location: 823

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173820 (Sample A) For Lab Use Only: AD08964	Date: 10/3/17 Time: 1145	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
173821 (Sample B) For Lab Use Only: AD08965	Date: 10/3/17 Time: 1200	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
173822 (Sample C) For Lab Use Only: AD08966	Date: 10/3/17 Time: 1214	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
173823 (Sample D) For Lab Use Only: AD08967	Date: 10/3/17 Time: 1415	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1

Relinquished By: Kenneth Hannon	Received By:	Date: 10/5/17	Time: 9:50
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173820, SB-01 at 11.0 - 11.5 ft depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☑ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173821, SB-01 at 6.5 - 7.0 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173822, SB-01 at 0.0 - 0.5 Ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173823, SB-02 at 3.0 - 3.5 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Remarks:

CCCC

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 8
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171006005
Location: B23

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173824 (Sample A)	Date: 10/3/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only AD08968	Time: 1430							
173825 (Sample B)	Date: 10/3/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only AD08969	Time: 1443							
173826 (Sample C)	Date: 10/3/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only AD08970	Time: 1450							
173827 (Sample D)	Date: 10/3/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only AD08971	Time: 1541							

Relinquished By: Kenneth Hannon	Received By:	Date: 10/5/17	Time: 9:50
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173824, SB-02 at 9.5 - 10.0 ft depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173825, SB-02 at 7.5 - 8.0 ft depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173826, SB-02 at 12.5 - 13.0 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173827, SB-03 at 6.5 - 7.0 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Remarks:

CCC C

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- [ ] Tape sealed and initialed
- [ ] Shipped
- [x] Hand Delivered

Total No. Of Containers: 8
Carrier:
By:

Collector's Name: Kenneth Hannon (Please Print)

Affiliation: [ ] KCRO [ ] NERO [ ] SERO [ ] SLRO [ ] SWRO [ ] WPP [ ] MGS [ ] HWP [x] ESP [ ] MoDOT [ ] MDC [ ] DHSS [ ] Other:

LAB USE ONLY!
Laboratory ID: 17100605
Location: 023

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173826 (Sample A)	Date: 10/3/17	VOAs	[x] None [ ] Chlorine [ ] UV [ ] Ozone [ ] Other:	D.O. / Flow / pH / Cond. / Temp. / Other:	[ ] Water [x] Soil [ ] Organic [ ] Sludge [ ] Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only: AD08972	Time: 1550							
173829 (Sample B)	Date: 10/3/17	VOAs	[x] None [ ] Chlorine [ ] UV [ ] Ozone [ ] Other:	D.O. / Flow / pH / Cond. / Temp. / Other:	[ ] Water [x] Soil [ ] Organic [ ] Sludge [ ] Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only: AD08973	Time: 1647							
173830 (Sample C)	Date: 10/3/17	VOAs	[x] None [ ] Chlorine [ ] UV [ ] Ozone [ ] Other:	D.O. / Flow / pH / Cond. / Temp. / Other:	[ ] Water [x] Soil [ ] Organic [ ] Sludge [ ] Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only: AD08974	Time: 1700							
173831 (Sample D)	Date: 10/3/17	VOAs	[x] None [ ] Chlorine [ ] UV [ ] Ozone [ ] Other:	D.O. / Flow / pH / Cond. / Temp. / Other:	[ ] Water [x] Soil [ ] Organic [ ] Sludge [ ] Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only: AD08975	Time: 1730							

Relinquished By: Kenneth Hannon	Received By: [signature]	Date: 10/5/17	Time: 9:50
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173828, SB-03 at 8.5 - 9.0 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173829, SB-04 at 8.0 - 8.5 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173830, SB-04 at 16.5 - 17.0 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173831, SB-0~~X~~5 (SB) at 8.0 - 8.5 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Remarks:

CCCC

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 8
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 17100 6005
Location: B23

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173832 (Sample A)	Date: 10/3/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz JAR 40mL AG	4C 4C	1 1
For Lab Use Only AD08976	Time: 1741							
173622 (Sample B)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz JAR 40mL AG	4C 4C	1 1
For Lab Use Only AD08978	Time: 0845							
173623 (Sample C)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz JAR 40mL AG	4C 4C	1 1
For Lab Use Only AD08978	Time: 0900							
172B90 (Sample D)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz JAR 40mL AG	4C 4C	1 1
For Lab Use Only AD08979	Time: 0942							

Relinquished By: Kenneth Hannon	Received By: Mark Pitt	Date: 10/5/17	Time: 9:50
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173832, SB-05 at 11.5 - 12.0 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample B

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173622, SB-06 at 11.0 - 11.5 Ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample C

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173623, SB-06 at 16.5 - 17.0 Ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample D

LDPR:	FEPA3	Job Code:	NJ18DAWS	Sample Reference ID:
Facility ID:	Site/Study Name: Dawson metals site		County: Camden	

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

172890, SB-07 at 0.5 - 1.0 Ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Remarks:

COCC

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 8
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171006005
Location: B23

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
172892 (Sample A)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz JAR 40 mL AG	4C 4C	1 1
For Lab Use Only AD08980	Time: 0955							
173620 (Sample B)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz JAR 40 mL AG	4C 4C	1 1
For Lab Use Only AD08981	Time: 1012							
173621 (Sample C)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz JAR 40 mL AG	4C 4C	1 1
For Lab Use Only AD08982	Time: —							
173619 (Sample D)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz JAR 40 mL AG	4C 4C	1 1
For Lab Use Only AD08983	Time: 1047							

Relinquished By: Kenneth Hannon	Received By: [signature]	Date: 10/5/17	Time: 9:50
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

172892, SB-07 at 5.5 - 6.0 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample B

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173620, SB-07 at 12.5 - 13.0 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample C

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173621 Blind ~~duplicate~~ replicate.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample D

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173619, SB-08 at 13.0 - 13.5 ft. depth

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy (check one)
			☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Remarks:

CCC

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Description of Delivery
- ☐ Tape sealed and initialed
- ☐ Shipped
- ☑ Hand Delivered

Total No. Of Containers: 6
Carrier:
By:

Collector's Name: (Please Print) Kenneth Hannon

Affiliation: ☐ KCRO ☐ NERO ☐ SERO ☐ SLRO ☐ SWRO ☐ WPP ☐ MGS ☐ HWP ☑ ESP ☐ MoDOT ☐ MDC ☐ DHSS ☐ Other:

LAB USE ONLY!
Laboratory ID: 171006005
Location: B23

Sample Number	Sample Collected	Analyses Requested	Disinfect. Type (check one)	Field Parameters (include units)	Matrix (check one)	Container Type	Preservative Type	Number of Containers
173618 (Sample A)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only AD08984	Time: 1100							
173617 (Sample B)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only AD08985	Time: 1323							
173616 (Sample C)	Date: 10/4/17	VOAs	☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:	2oz Jar 40mL AG	4c 4c	1 1
For Lab Use Only AD08986	Time: 1334							
(Sample D)	Date:		☑ None ☐ Chlorine ☐ UV ☐ Ozone ☐ Other:	D.O. Flow pH Cond. Temp. Other:	☐ Water ☒ Soil ☐ Organic ☐ Sludge ☐ Other:			
For Lab Use Only	Time:							

Relinquished By: Kenneth Hannon	Received By:	Date: 10/5/17	Time: 9:50
Relinquished By:	Received By:	Date:	Time:
Relinquished By:	Received By:	Date:	Time:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FIELD SHEET AND CHAIN-OF-CUSTODY RECORD

Sample A

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173618, SB-08 at 10.5 - 11.0 ft. depth.

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample B

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173617, SB-09 at 6.0 - 6.5 ft. depth

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample C

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

173616, SB-09 at 13.5 - 14.0 ft. depth

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☒ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Sample D

LDPR: FEPA3 | Job Code: NJ18DAWS | Sample Reference ID:

Facility ID: | Site/Study Name: Dawson metals site | County: Camden

Sample Comment (where and how the sample was collected): ☑ Grab ☐ Composite ☐ Modified ☐ Other:

GPS Coordinates (UTM Zone 15 NAD83 Only)	X Easting	Y Northing	Accuracy	(check one)
				☐ EPE (meters) ☐ PDOP

Sample Event Type: *(check one)*
☐ Bypass/SSO ☐ Complaint ☐ Emergency Response ☐ Inspection ☑ Investigation ☐ Monitoring ☐ Special Project

Sample Type: *(check one)*
☐ Air ☐ Soil ☐ Container ☐ Spill ☐ QA/QC ☐ Wipes ☐ Groundwater ☐ Storm Water ☐ Organic ☐ Surface Water ☐ Sediment ☐ Discharge ☐ Sludge ☐ Drinking Water Supply

Remarks:

Camden-Dawson Metals Date: 10/2/17
FEPA 3/NJDEP DAWS Arrival Time: 0630
Depart Time: 1900

Participates: Amanda Branson
Sean Cunningham
Caleb Trentt

IA# -01 Room - 1 West end

ID# 173782 173783 Dup
Can# 6L1642 6L1568
Start PSI = 30/26 Start Time: 0642
Stop PSI = 5.0/3.0 Stop Time: 1525

IA# -02 Room 1 Shelving
ID# 173784
Can# 6L0622
Start PSI = 28 Start Time: 0644
Stop PSI: 7.0 Stop Time: 1529

IA# -03 Room 2 - middle Shelf
ID# 173785
Can# 6L0540
Start PSI = 29.5 Start Time: 0646
Stop PSI = 5.0 ~~Start~~ Stop Time: 1534

Rite in the Rain

IA-04 Room 3 middle of Room hang self
ID# 173786
can# 6L1527
start PSI=29 start Time: 0651
stop PSI = 5.0 stop Time: 1536

IA-05 - Room 4
ID# 173787
Can# 6L0070
Start PSI = 30 start Time: 0656
stop PSI = 7.0 stop Time: 1543

IA-06 - Room 5 - middle of Room hanging
ID# 173788
can# 6L1242
start PSI = 30.0 start Time = 0659
stop PSI = 6.0 stop Time: 1546

IA AI-07 - Room 6 - work station shelf
ID# 173789
can# 6L0742
start PSI = 29 start Time. 0702
stop PSI = 6.0 stop Time = 1548

IA AI-08 - Room 6 SE corner hanging on shelf
ID# 173790
6L1534
start PSI = 28 start Time: 0704
stop PSI = 5.0 stop Time: 1549

IA-09 - Room 7 mid. rm work shelf
ID# 173791
Can# 1051
start PSI = 30.0 start Time, 0708
stop PSI = 6.0 start Time: 1551

IA AI-10 - Unisex Bathroom -
ID# 173792
can# 6L0465
start PSI = 30.0 start Time: 0715
stop PSI = 9.0 stop Time: 1554

IA AI-11 - Break Room shelf under TV
ID# 173793
Can# 6L0864
start PSI = 30.0 start Time: 0717
stop PSI = 6.0 stop PSI = 1555

IA AI 12 - Front Room Filing cabinate near front door
ID# 173794
Can# 1886
start PSI = 30.0 start Time: 0721
Stop PSI = 9.0 Stop Time: 1556

AA-01 Back of building on old platform near dump site
ID# 173795
Can# 6L1341
start PSI = 29.0 start Time = 0729
stop PSI = 5.0 stop Time = 1558

Rite in the Rain

AA-02 Front of building in catalpa Tree

ID# 173796

Coin# 64.1263

start PSI = 30.0 start Time: 0738

stop PSI = 10.0 stop Time: 1618

Trip Blank ID# 173807

Time: 0752

~~DW-07~~ Calibrations

pH = 7.0 = 6.86

pH = 10.0 = 9.89

cond = 1413 = 1406

~~DSW-01~~ - Unnamed creek behind building

~~ID# 173808 Time: 0820~~

- No Water - Dry bed.

DW-01 - Loc 113 - Right front of Barn

ID# 173808 Time: 0847

pH	6.98	6.96
Temp	17.8	17.0
cond	968	951
Time:	0843	8446

DW-02 - Loc ID 111 - spigot prior to H_2O softner

ID# 173809 Time: 0913

pH	6.92	6.92
Temp	17.8	17.5
Cond	829	799
Time:	0909	0912

- spigot in Basement at the base of H_2O softner.

DW-03 Loc ID # 103 - spigot on back of house.

ID# 173810 Time: 0935

pH	7.05	7.05
Temp	17.8	18.9
Cond	758	739
Time:	0931	0934

~~DW-04~~ Loc ID# 112 Spigot non-functional

~~ID# 173811~~ Time:

pH	
Temp	
Cond	
Time	

Rite in the Rain

DW-04 -Loc ID# 114 spigot on front corner of house

ID# 173811 Time: 1006

pH	6.79	6.75
Temp	18.9	18.5
cond	1400	1388
Time	1002	1005

DW-05 Loc ID# 115 spigot behind the house

ID# 173812 Time: 1035

pH	6.73	6.71
Temp	17.9	17.82
cond	976	951
Time	1031	1034

~~1034~~

DW-06 Loc ID# 117 spigot on front of house

ID# 173813 Time: 1050

pH	6.70	6.65
Temp	15.8	19.0
Cond	1030	1014
Time	1047	1050

DW-07 Loc ID# 118 spigot on side of house facing the road

ID# 173814 Time: 1108

pH	6.89	6.77
Temp	18.3	17.7
Cond	832	814
Time	1104	1107

DW-08 Loc ID# 108 spigot in well house

ID# 173815 Time: 1145

pH	7.08	7.03
Temp	18.1	16.5
cond	672	657
Time	1142	1145

DW-09 Loc ID 124 spigot at well head

ID# 173816 Time: 1200

pH	6.80	6.68
Temp	17.8	16.9
cond	897	873
Time	1155	1158

Rite in the Rain

DW-10 - Camdenton Public well #4

ID# 173817 / 173818 (Dup.) Time: 1327

pH	7.15	7.13
Temp	18.3	17.9
Cond	722	659
Time:	1322	1325

* AT+T, Charter, City Camd. LacLede, Show me Tech, Summit Gas

DW-11 Loc ID # 116 A Bathroom sink, downstairs Nearest the well head

ID# 173819 Time: 1847

pH	6.77	6.73
Temp	18.5	17.6
Cond	1472	1432
Time	1842	1845

Day 2 | 10/3/17 *PID calibration @ 100.6 ppm

SB-01 - 4.0 ft. northwest of old loading dock 13 ft North of dock edge

SB-01 cont.

PID Readings

0 → ~~0~~ 0.5 = 451.1 *

0.5 → 1.0 = 30.7

1.0 → 1.5 = 23.0 1.5 → 2.0 = 41.5

2.0 → 2.5 = 13.7 2.5 → 3.0 = 19.8

3.0 → 3.5 = 17.6 3.5 → 4.0 = 9.1

4.0 → 4.5 = 4.5 4.5 → 5.0 = 0.6

5.0 → 5.5 = 11,290 5.5 → 6.0 = 15,000*

6.0 → 6.5 = 15,000 6.5 → 7.0 = 15,000 *

7.0 → 7.5 = 15,000 7.5 → 8 ft = 15,000

8.0 → 8.5 = 15,000 8.5 → 9.0 = 31.6

9.5 → 10.0 = 3.4 10.0 → 10.5 = 15,000

10.5 → 11.0 = 10,200 11.0 → 11.5 = 15,000 *

11.5 → 12.0 = 3309 12.0 → 12.5 = 468

Soil Profile

0 → 0.5 ft = Rock fill material

0.5 → 4.5 ft = Tight Brown Clay

4.5 → 6.5 ft = Mottled Red Brown Clay

6.5 → 10.0 ft = Tight Red Clay

10.5 → ~~11.8~~ 11.5 ft = Rock lens

11.5 → 12.0 ft = Tight ~~Brown~~ Red Clay

12.0 → 12.5 ft = dry weathered bedrock

11.0 → 11.5' = Sand lense

Rite in the Rain

SB-01 11.5 ft. Sample.

11.0 - 11.5 ft - Sand lense at this Point

2B → 31 - Brown sandy soil

~~*~~ photos taken on 12.5 → 10 ft.

ID # 173820 Time: 1145

Sample # 173820

SB-01 6.5 → 7.0 Sample

Sample # 173821 Time: 1200

SB-01 5-10 ft photo log 32-35

SB-01 0-~~0~~5 ft photo log 36-39

- Tight Red clay

SB-01 0.0 → 0.5 Sample

- Soft Brow clay w/ rocks

ID # 173822 Time: 1214

SB-02 4.0 ft NW of old loading dock at the south end of the dock

PID Readings

0.0 → 0.5 ft = 2.5 0.5 → 1.5 ft = 9.3

1.5 → 2.0 ft = 35.7 2.0 → 2.5 ft = 85.2

2.5 → 3.0 ft = 130.1 3.0 → 3.5 ft = 143.8 *

3.5 → 4.0 ft = 55.0 4.0 → 4.5 ft = 16.3

4.5 → 5.0 ft = 0.4 5.0 → 5.5 ft = 39.3

5.5 → 6.0 ft = 595.7 6.0 → 6.5 ft. = 611

SB-02 cont soil PID

6.5 → 7.0 ft = 1035 7.0 → 7.5 FT = 1081

* 7.5 → 8.0 ft = 1030 8.0 → 8.5 ft = 352.9

8.5 → 9.0 ft = 270 9.5 → 10.0 ft = 0.0 *

10.0 → 10.5 ft = 179.5 10.5 → 11.0 ft = 637

11.0 → 11.5 ft = 674 11.5 → 12.0 ft = 258

12.0 → 12.5 ft = 554 12.5 → 13.0 ft = 722 *

13.0 → 13.5 ft = 6.9

Soil Profile

0 → 2.0 = loose red gray clay

2.0 → 3.5 = Rock clay lense, loose + Sandy

3.0 → 10.5 = Red clay tight.

10.5 = Rock lense

10.5 → 12.0 - Tight Red Clay

12.0 - 12.5 ft - Rock lense

12.5 → 13.5 - Tight Red Clay

SB-02 at 3.0 → 3.5 ft

- Fractured Rock w/ tight clay

ID # 173823 Time: 1415

SB-02 at 9.5 to 10.0 ft

- Tight Red Clay

ID # 173824 Time: 1430

Rite in the Rain

SB-2 at 7.5 to 8.0 ft
-Tight Red Clay
ID# 173825 Time: 1443

SB-2 at 12.5 to 13.0 ft
-Tight Red Clay
ID# 173826 Time: 1450

SB-03 22.0 ft NW of old loading dock and 8.0 ft ~~not~~ ~~south~~ of North edge of dock

PID Readings

0.0 → 0.5 ft. = 7.9	0.5 → 1.0 ft = 10.4
1.0 → 1.5 ft = 7.7	1.5 → 2.0 ft = 6.2
2.0 → 2.5 ft = 2.9	2.5 → 3.0 ft = 0.1
3.0 → 3.5 ft = 0.8	3.5 → 4.0 ft = 0.2
4.0 - 4.5 ft = 0.0	4.5 → 5.0 ft = 0.0
5.0 - 5.5 = 16.9	5.5 - 6.0 ft = 27.8
6.0 - 6.5 = 32.1	*6.5 → 7.0 ft = 41.4
7.0 → 7.5 ft = 42.4	7.5 → 8.0 ft = 19.6
8.0 → 8.5 ft = 11.6	*8.5 → 9.0 ft = 38.4
9.5 → 10 ft = 0.0	10.0 → 10.5 ft = 2.6
10.5 → 11.0 ft = 18.6	11.0 → 11.5 ft = 46.7
11.5 → 12.0 ft = 46.1	12.0 → 12.5 ft = 77.8
12.5 → 13.0 ft = 86.1 *	13.0 → 13.5 ft = 0.0

SB-03 Soil Profile
0.0 → 1.0 ft = Loose gravel fill
1.0 → 2.3 ft = Tight brown Clay
2.3 → 3.0 ft = loose brown Clay / Rock mix
3.0 → 5.0 ft = Tight brown / gray / Red mottled
5.0 → 13.5 ft = Tight Red clay Clay

SB-03 at 6.5 to 7.0 ft
-tight Red clay
ID# 173827 Time: 1541

SB-03 at 8.5 to 9.0 ft
-tight Red Clay
ID# 173828 Time: 1550

SB-04 20.0 ft from the base of the first loading dock Ramp.

PID Readings

0.0 → 0.5 = 0.2	0.5 → 1.0 = 0.7
1.0 → 1.5 = 1.0	1.5 → 2.0 = 0.6
2.0 → 2.5 = 0.5	2.5 → 3.0 = 0.1
3.0 → 3.5 = 0.0	3.5 → 4.0 = 0.0
4.0 → 4.5 = 0.0	4.5 → 5.0 = 0.2
5.0 → 5.5 = 0	5.5 → 6.0 = 0.7

Rite in the Rain

SB-04 Continued

PID Readings

6.0 → 6.5 = 1.4	6.5 → 7.0 = 1.4
7.0 → 7.5 = 1.3	7.5 → 8.0 = 0.7
8.0 → 8.5 = 1.3	8.5 → 9.0 = 1.2
9.0 → 9.5 = 0.0	9.5 → 10.0 = 0.0
10.0 → 10.5 = 1.1	10.5 → 11.0 = 1.6
11.0 → 11.5 = 4.0	11.5 → 12.0 = 5.4
12.0 → 12.5 = 4.8	12.5 → 13.0 = 4.6
13.0 → 13.5 = 6.8	13.5 → 14.0 = 5.6
14.0 → 14.5 = 0.0	14.5 → 15.0 = 1.0
15.0 → 15.5 = 0.7	15.5 → 16.0 = 0.6
16.0 → 16.5 = 0.1	16.5 → 17.0 = 0.0

Soil Profile

0.0 - 0.9 ft = loose gravely fill
0.9 → 2.5 ft = Tight Red Clay
2.5 → 3.0 ft = Clay / Rock mix
3.0 → 10.5' = Tight Red Clay
10.5 → 12.0 = Rock / Clay mix
12.0 → 17.0 = Tight Red Clay 16.0 = Rock lens

SB-04 at 8.0 to 8.5 ft
- Tight Red Clay

ID # 173829 Time: 1647

SB-04 at 16.5 to 17
- Tight Red Clay

ID # 173830 Time = 1700

SB-05 | 55 ft NW of old loading dock
15.0 ft from North end.

PID Readings

0.0 → 0.5 ft = 1.0	0.5 → 1.0 ft = 0.0
1.0 → 1.5 ft = 0.7	1.5 → 2.0 ft = 0.7
2.0 → 2.5 ft = ~~0.7~~ AB 1.1	2.5 → 3.0 ft = 0.4
3.0 → 3.5 ft = 1.0	3.5 → 4.0 = 1.3
4.0 → 4.5 ft = 0.9	4.5 → 5.0 = 0.0
5.0 → 5.5 ft = 0.0	5.5 → 6.0 = 1.8
6.0 → 6.5 ft = 1.5	6.5 → 7.0 = 0.8
7.0 → 7.5 ft = 1.7	7.5 → 8.0 = 2.8
8.0 → 8.5 ft = 3.4 *	8.5 ft → 9.0 = 2.7
9.0 → 9.5 = 0	9.5 → 10 = 0
10.0 → 10.5 = 1.0	10.5 → 11 = 0.6
11 → 11.5 = 0.5	11.5 → 12 = 0.0 *

Soil Profile

0.0 → 1.0 = loose gravely Fill
1.0 → 3.5 = Brownish gray clay, tight.
3.5 → 4.0 = Clay / Rock mix
4.0 → 12.0 = Tight red clay

Rite in the Rain

Soil Profile (cont)

SB-05 at 8.0 to 8.5 ft.
-Tight Red Clay
ID # 173831 Time: 1730

SB-05 at 11.5 to 12.0ft
-Tight Red Clay
ID # 173832 Time: 1741

Day 3

Date: 10/3/17
Arrival Time 0745

SB-06 (~~05~~) - North end of building at old loading ~~be~~dock, 6ft north of the SE end of the dock.

PID Readings PID calibration @ 104.1 (ok)

0.0 → 0.5 = 0.9	0.5 → 1.0 = 1.3
1.0 → 1.5 = 1.1	1.5 → 2.0 = 0.6
2.0 → 2.5 = 0.6	2.5 → 3.0 = 0.9
3.0 → 3.5 = 1.3	3.5 → 4.0 = 0.6
4.0 → 4.5 = 0.9	4.5 → 5.0 = 0.6
5.0 → 5.5 = 0.6	5.5 → 6.0 = 3.2
6.0 → 6.5 = 2.8	6.5 → 7.0 = 2.7

SB-06 Continued

PID Readings

7.0 → 7.5 = 3.5	7.5 → 8.0 = 3.7
8.0 → 8.5 = 4.1	8.5 → 9.0 = 4.1
9.0 → 9.5 = 3.2	9.5 → 10.0 = 0.7
10.0 → 10.5 = 1.7	10.5 → 11.0 = 3.0
11.0 → 11.5 = 4.5 *	11.5 → 12.0 = 3.7
12.0 → 12.5 = 3.8	12.5 → 13 = 3.9
13.0 → 13.5 = 2.0	13.5 → 14 = 1.0
14.0 → 14.5 = 0.6	14.5 → 15 = 0.6
15.0 → 15.5 = 2.6	15.5 → 16.0 = 2.8
16.0 → 16.5 = 3.8	16.5 → 17.0 = 0.3 *

Soil Profile

0.0 → 1.5 ft. = loose gravely fill
1.5 → 3.5 = loose gravely red clay
3.5 → 5.5 = Tight red clay
5.5 = Rock lense
5.6 → 11.5 = Tight red clay
11.5 → 12.0 = Red clay / Rock mix
12.0 → ~~16.5~~ 17.0 = Red Clay
16.5 - Rock lense

SB-06 at 11.0 → 11.5
-Tight Red clay
ID # 173622 Time: 845



Rite in the Rain

SB-06 at 16.5 to 17.0
- Tight Red Clay
ID# 173623 Time: 0900

SB-07 old platform at north corner of the building, 5.0 ft NW of corner

PID Readings

0.0 → 0.5 = 233	*0.5-1.0 = 125.2
1.0 → 1.5 = 40.6	1.5 → 2.0 = 24.7
2.0 → 2.5 = 20.6	2.5 → 3.0 = 12.8
3.0 → 3.5 = 3.7	3.5 → 4.0 = 3.7
4.0 → 4.5 = 5.0	4.5 → 5.0 = 1.0
5.0 → 5.5 = 2.6	*5.5 → 6.0 = 1057
6.0 → 6.5 = 752	6.5 → 7.0 = 357
7.0 → 7.5 = 106.5	7.5 → 8.0 = 9.1
8.0 → 8.5 = ~~9~~ AB 5.0	8.5 → 9.0 = 4.7
9.0 → 9.5 = 5.2	9.5 → 10. = 4.7
10.0 → 10.5 = ~~157~~ AB 176	10.5 → 11 = ~~176~~ AB ~~366~~ 360.6
11.0 → 11.5 = 731	11.5 → 12 = 935
12.0 → 12.5 = 933.8	**12.5 → 13 = 1209
13.0 → 13.5 = 1197	13.5 → 14 = 1.2

SB-07 at ~~0.0~~ 0.5 to 1.0 ft.
- Tight to loose brown clay
ID# 172890 Time = 0942

Soil profile
0.0 → 0.5 = loose gravely fill
0.5 → 3.5 = Tight Brown Clay
3.5 → 6.5 = Tight Red Clay
6.5 - Rock lense. 6.5 → 14.0 = Tight Red Clay

SB-07 at 5.5 to 6.0 ft
- Tight Red Clay
ID# 172892 Time: 0955

SB-07 at 12.5 to 13.0 Ft.
- Tight Red Clay
ID # 173620 / 173621 Dup Time: 1012

SB-08 20 ft north of north corner of the old platform

Soil PID

0.0 → 0.5 → 2.5	0.5-1.0 = 3.4
1.0 → 1.5 = 12.2	1.5 → 2.0 = 14.9
2.0 → 2.5 = 14.3	2.5 → 3.0 = 11.7
3.0 → 3.5 = 0.3	3.5 → 4.0 = 0.4
4.0 → 4.5 = 0.4	4.5 → 5.0 = 0.4
5.0 → 5.5 = 8.7	5.5 → 6.0 = 31.6
6.0 → 6.5 = 35.6	6.5 → 7.0 = 34.2
7.0 → 7.5 = 32.7	7.5 → 8.0 = 37.2
8.0 → 8.5 = 37.2	8.5 → 9.0 = 36.~~7~~ Rain

SB-08 Continued

PID Readings

9.0→9.5 = 0.2	9.5→10.0 = 0.4
10.0→10.5 = 34.0	*10.5→11.0 = 44.8
11.0→11.5 = 42.6	11.5→12 = 16.5
12.0→12.5 = 9.3	12.5→13.0 = 16.9
13.0→13.5 = 49.2 *	13.5→14.0 = 16.9
14.0→14.5 = 0.2	14.5→15.0 = 3.4

SB-08 at 13.0 to 13.5

- Tight Red Clay

ID # 173619 Time: 1047

~~15~~ Soil Profile

15.0→14.5 = weathered bedrock

14.5→12.5 = Tight Red Clay

12.5→12.0 = Sandy Clay

12.0→5.0 = Tight red Clay

5.0→3.0 = loose gray Clay

3.0→1.0 = Silty gray Clay

1.0→0.0 = gravely fill

SB-08 at 10.5 to 11.0

-Tight Red Clay

ID # 173618 Time: 1100

SB-09 41.0 ft North of old concrete pad in north corner of the building.

Soil PID

0.0→0.5 = 1.9	0.5→1.0 = 2.4
1.0→1.5 = 1.4	1.5→2.0 = 5.1
2.0→2.5 = 13.8	2.5→3.0 = 14.8
3.0→3.5 = 12.8	3.5→4.0 = ~~12.8~~ 2.1
4.0→4.5 = 0.5	4.5→5.0 = 0.7
5.0→5.5 = 19.0	5.5→6.0 = 19.3
6.0→6.5 = 20.0*	6.5→7.0 = 20.2
7.0→7.5 = 17.6	7.5→8.0 = 15.4
8.0→8.5 = 14.6	8.5→9.0 = 11.1
9.0→9.5 = 3.6	9.5→10.0 = 3.4
10.0→10.5 = 6.9	10.5→11.0 = 21.0
11.0→18.5 = 20.0	11.5→12.0 = 14.2
12.0→12.5 = 10.0	12.5→13 = 5.1
13.0→13.5 = 27.3	*13.5→14.0 = 30.0
14.0→14.5 = 0.0	14.5→15.0 = 0.0

~~Soil~~Soil Profile

0.0→2.0 ft = loose gravely fill

2.0→2.5 ft = gray clay/gravel mix

2.5→3.0 ft = loose gray clay

3.0→3.5 ft = Clay Rock mix gray

3.5→7.0 ft = ~~Tight~~ Medium gray Clay.

7.0→11.5 ft = Tight red clay

11.5→12.5 ft = Sand lense

12.5→15.0 ft = Tight Red Clay

Rite in the Rain

SB-09 at 6.0 to 6.5 ft
- medium red/gray Clay
ID #173617 Time: 1323

SB-09 at 13.5 to 14.0 ft.
- Tight Red Clay
ID #173616 Time: 1334

Trip Blank ID #173837 Time: 1411

DW-12 Loc ID 126 - Front of house

ID #173836 Time: 1427

pH	6.61	6.47
Temp	15.7	15.6
cond	867	843
Time	1423	1426

Rite in the Rain

Dawson Site 10/4
Sub-Slab VI Sampling

Breakroom SS11
Can # IL1629
Start pressure 27 Time 0903
end pressure 4 Time 0912
Sample # 173842

Copy room/office SS12
Can # IL2817
Start pressure 27.5 Time 0903
end pressure 4 Time 0913
Sample # 173843

Room 1 SS1
Can # 3049
Start pressure 28 Time 0924
end pressure 4 Time 0934
Sample # 173844

Room 1 SS13
Can # IL2743 Sample # 173845
Start pressure 30 Time 0922
end pressure 4 Time 0934

Rite in the Rain

10-2-17 Modine

Trip blank Sample # 173797

Meter check
Cond: 1411
Ph: 7: 7.02
10: 10.05
4: 4.05
ORP: 190.0

697 Ballpark Rd
Location ID 120

- Began purge at 833

0838
Temp: 15.6
DO: 4.86 mg/L
Cond: 643
Ph: 7.13
ORP: 190.9

0841
Temp: 15.3
DO: 5.30
Cond: 587
Ph: 6.91
ORP: 185.5

0844
Temp: 15.3
DO: 5.49
Cond: 586
Ph: 6.96
ORP: 175.8
Sample # 173798, (DW-13) was take from spigot at 0848

10 Hyd-a-Wall
Location ID 121

Began purge at 0859

0903
Temp: 16.2
DO: 9.92
Cond: 642
Ph: 7.24
Cond: 158.4

0906
Temp: 18.5
DO: 8.12
Cond: 640
Ph: 7.16
Cond: 164.4

0909
Temp: 19.7
DO: 7.29
Cond: 645
Ph: 7.13
ORP: 165.4

0912
Temp: 19.5
DO: 6.50
Cond: 647
Ph: 7.11
ORP. 166.0

Rite in the Rain

0915
Temp: 19.1
DO: 6.55
Cond: 639
Ph: 7.10
ORP: 165.9

Sample # 173799, (DW-14)
taken from spigot on back of house at 0918

Bellmont Duplex ID #106
Began purge at 0929

0934
Temp: 17.4
Cond: 534
DO: 5.24
Ph: 7.29
ORP: 150.6

0937
Temp: 17.5
DO: 5.11
Cond: 529
Ph: 7.23
ORP: 142.4

0940
Temp: 17.5
DO: 4.83
Cond: 528
Ph: 7.21
ORP: 137.5

0943
Temp: 17.5
DO: 4.76
Cond: 527
Ph: 7.17
ORP: 130.8

Sample # 173800 (DW-15)
taken from wellhouse at 0945

Sample # 173801 is blind duplicate of 173800

1197 Ballpark Rd ID #122
began purge 1013

1016
Temp: 16.0
DO: 5.80
Cond: 708
Ph: 7.25
ORP: 127.9

1019
Temp: 15.7
DO: 5.78
Cond: 707
Ph: 7.14
ORP: 119.5

1022
Temp: 15.5
DO: 5.73
Cond: 703
Ph: 7.11
ORP: 113.8

Sample # 173802 (DW-16) taken from spigot on well house at 1025

Rite in the Rain

1207 Ballpark Rd ID# 123

CT began purge 1035

~~1038~~ 1041
Temp: 16.3
DO: 5.84
Cond: 573
Ph: 7.27
ORP: 87.3

1044
Temp: 16.3
DO: 5.85
Cond: 569
Ph: 7.23
ORP: 79.3

1047
Temp: 16.8
DO: 5.43
Cond: 575
Ph: 7.23
ORP: 74.6

1050
Temp: 16.5
DO: 5.38
Cond: 574
Ph: 7.22
ORP: 62.4

Sample # 173803 (DW-17) taken from Spigot on front of house at 1053

139 Banner St Location ID 119

began purge at 1125

1128
Temp: 16.8
DO: 6.12
Cond: 571
Ph: 7.19
ORP: 88.1

1131
Temp: 17.0
DO: 5.78
Cond: 559
Ph: 7.18
ORP: 66.9

1134
Temp: 16.7
DO: 5.87
Cond: 560
Ph: 7.16
ORP: 50.1

Sample # 173804 (DW-18) taken from Spigot in garage at 1140

Rite in the Rain

SW-01 Spring near old abandoned house

Temp: 18.0
DO: 5.84
Cond: 642
Ph: 7.23
ORP 80.6

Sample # 173805 taken at 1405

SW-02 Cullen spring
Temp: 14.8
DO: 8.55
Cond: 465.7
Ph: 7.01
ORP: 96.0

Sample # 173806 taken from Cullen Springs at 1435

Dawson Cont.
10/4/17

Room 1 SS2
Can # IL2880
Start pressure 30 Time 0945
end pressure 6 Time 0957
Sample # 173846

Room 2 SS3 co-located to SS2
Can # IL2484
Start pressure 30 Time 0946
end pressure 4 Time 0957
Sample # 173847

Room 1 SS 14
Can # IL1755
Start pressure 28 Time 0946
end pressure 4 Time 0955
Sample # 173848

Room 2 SS4
Can # IL1566
Start pressure 29 Time 1003
end pressure 4 Time 1015
Sample # 173849

Room 3 SS 5
Can # IL1826
Start pressure 30 Time 1022
end pressure 4 Time 1034
Sample # 173850

Room 5 SS 6
Can # IL1843
Start pressure ~~1028~~ 30 psi Time 1025
end pressure 4 Time 1039
Sample # 173851

Room 6 SS 7
Can # IL1839
Start pressure 30 Time 1046
end pressure 4 Time 1058
Sample # 173852

Rite in the Rain

Dawson Ste cont. 10/4/17
Room 7 SS 8
Can # IL1775
Start pressure 28 Time 1103
end pressure 4 Time 1115
Sample # 173853

Room 7 SS 9
Can # 8035?
Start pressure 1104 Time 26.5
end pressure 1114 time 4
Sample # 173854

Room 8 SS 10
Can # 2191
Start pressure 30 Time 1121
end pressure 4 time 1136
Sample # 173855

ST #	SOIL BORING LOG	BORING # SB-01
R #	INVESTIGATOR Ken Hannon	DRILLER Ken Hannon
SITE NAME Dawson Metals #2	DRILLING METHOD Direct Push	SAMPLING METHOD Solid Tube
SITE ADDRESS Camdenton	BOREHOLE DIA. 2 inches	SAMPLING INTERVAL
DATE OF BORING 10/3/17	TOTAL BORING DEPTH 12.5'	STATIC WATER LEVEL Dry

LITHOLOGIC DESCRIPTION AND REMARKS

WELL CONST	DEPTH (~Ft.)	COLOR	TEXTURE	OBSERVATIONS	PID ppm	TCE RESULT ppm
	0.0-0.5	Gray	Rock	Rock fill material	49.1	87
	0.5-1.0	Brown	Clay	Tight Brown Clay	30.7	
	1.0-1.5				23.0	
	1.5-2.0				41.5	
	2.0-2.5				13.7	
	2.5-3.0				19.8	
	3.0-3.5				17.6	
	3.5-4.0				9.1	
	4.0-4.5				4.5	
	4.5-5.0	Red/Brown	Clay	mottled Red/Brown Clay	0.6	
	5.0-5.5				11,250	
	5.5-6.0				15,000	
	6.0-6.5				15,000	
	6.5-7.0				15,000	6740
	7.0-7.5	Red		Tight Red Clay	15,000	
	7.5-8.0				15,000	
	8.0-8.5				15,000	
	8.5-9.0				31.6	
	9.0-9.5				3.4	
	9.5-10				~~3.4~~	
	10.0-10.5	Gray	Rock	Rock lens	15,000	
	10.5-11.0	Red	Clay	Tight Red Clay	10,200	
	11.0-11.5	White	Sand	Sand lens	15,000	ND
	11.5-12.0		Rock	Dry weathered bedrock	3307	
	12.0-12.5		Rock	Dry Weathered bedrock	468	
	12.5-13.0					
	13.0-13.5					
	13.5-14.0					
	14.0-14.5					
	14.5-15.0					
	15.0-15.5					
	15.5-16.0					
	16.0-16.5					
	16.5-17.0					
	17.0-17.5					

ST #	SOIL BORING LOG	BORING # SB-02
R #	INVESTIGATOR Ken Hannon	DRILLER Ken Hannon
SITE NAME Dawson Metals #2	DRILLING METHOD Direct Push	SAMPLING METHOD Solid Tube
SITE ADDRESS Camdenton	BOREHOLE DIA. 2 inches	SAMPLING INTERVAL
DATE OF BORING 10/3/17	TOTAL BORING DEPTH 13.5	STATIC WATER LEVEL Dry

LITHOLOGIC DESCRIPTION AND REMARKS

WELL CONST	DEPTH (~Ft)	COLOR	TEXTURE	OBSERVATIONS	PID ppm	TCE RESULT ppm
	0.0-0.5	Red/gray	Clay	loose red/gray clay	2.5	
	0.5-1.0				~~2.5~~	
	1.0-1.5				9.3	
	1.5-2.0				35.7	
	2.0-2.5	Not identified	Rock/clay/sand	Rock/clay lense loose + sandy	85.2	
	2.5-3.0				130.1	
	3.0-3.5	Red	Clay	Tight Red Clay	143.8	160
	3.5-4.0				55.0	
	4.0-4.5				16.3	
	4.5-5.0				0.4	
	5.0-5.5				37.3	
	5.5-6.0				595.7	
	6.0-6.5				611	
	6.5-7.0				1035	
	7.0-7.5				1081	
	7.5-8.0				1030	874
	8.0-8.5				352.9	
	8.5-9.0				270	
	9.0-9.5				0.0	
	9.5-10				—	463
	10.0-10.5				179.5	
	10.5-11.0	~~Red~~ Gray Red	Rock Clay	Rock lens w/ Tight Red clay	637	
	11.0-11.5			Red clay, tight	674	
	11.5-12.0			Tight Red Clay	258	
	12.0-12.5	Gray	Rock	Rock lense	554	
	12.5-13.0	Red	Clay	Tight Red Clay	722	237
	13.0-13.5				6.9	
	13.5-14.0				—	
	14.0-14.5				—	
	14.5-15.0				—	
	15.0-15.5				—	
	15.5-16.0				—	
	16.0-16.5				—	
	16.5-17.0				—	
	17.0-17.5				—	

ST #	SOIL BORING LOG	BORING # SB-03
R #	INVESTIGATOR Ken Hannon	DRILLER Ken Hannon
SITE NAME Dawson Metals #2	DRILLING METHOD Direct Push	SAMPLING METHOD Solid Tube
SITE ADDRESS Camdenton	BOREHOLE DIA. 2 inches	SAMPLING INTERVAL
DATE OF BORING 10/3/17	TOTAL BORING DEPTH 13.5'	STATIC WATER LEVEL Dry

LITHOLOGIC DESCRIPTION AND REMARKS

WELL CONST	DEPTH (~Ft.)	COLOR	TEXTURE	OBSERVATIONS	PID ppm	TCE RESULT ppm
	0.0-0.5	Gray	gravel	loose gravel fill	7.9	
	0.5-1.0	⊥	⊥	⊥	10.4	
	1.0-1.5	Brown	Clay	Tight brown clay	7.7	
	1.5-2.0	⊥	⊥	⊥	6.2	
	2.0-2.5	⊥	⊥	⊥	2.9	
	2.5-3.0	Brown ~~Brown/gray/Red~~	Clay/Rock	loose brown clay/Rock mix	0.1	
	3.0-3.5	Brown/gray/Red	Clay	Tight mottled brown/gray/Red clay	0.0	
	3.5-4.0	⊥	⊥	⊥	0.2	
	4.0-4.5	⊥	⊥	⊥	0.0	
	4.5-5.0	⊥	⊥	⊥	0.0	
	5.0-5.5	Red	⊥	Tight Red clay	16.9	
	5.5-6.0	⊥	⊥	⊥	27.8	
	6.0-6.5	⊥	⊥	⊥	32.1	
	6.5-7.0	⊥	⊥	⊥	41.4	65
	7.0-7.5	⊥	⊥	⊥	42.4	
	7.5-8.0	⊥	⊥	⊥	19.6	
	8.0-8.5	⊥	⊥	⊥	11.6	
	8.5-9.0	⊥	⊥	⊥	38.4	38
	9.0-9.5	⊥	⊥	⊥	0.0	
	9.5-10	⊥	⊥	⊥	2.6	
	10.0-10.5	⊥	⊥	⊥	18.6	
	10.5-11.0	⊥	⊥	⊥	46.7	
	11.0-11.5	⊥	⊥	⊥	46.1	
	11.5-12.0	⊥	⊥	⊥	77.8	
	12.0-12.5	⊥	⊥	⊥	86.1	
	12.5-13.0	⊥	⊥	⊥	0.0	
	13.0-13.5	⊥	⊥	⊥	0.0	
	13.5-14.0					
	14.0-14.5					
	14.5-15.0					
	15.0-15.5					
	15.5-16.0					
	16.0-16.5					
	16.5-17.0					
	17.0-17.5					

ST #	SOIL BORING LOG	BORING # SB-04
R #	INVESTIGATOR Ken Hannon	DRILLER Ken Hannon
SITE NAME Dawson Metals #2	DRILLING METHOD Direct Push	SAMPLING METHOD Solid Tube
SITE ADDRESS Camdenton	BOREHOLE DIA. 2 inches	SAMPLING INTERVAL
DATE OF BORING 10/3/17	TOTAL BORING DEPTH 17.0'	STATIC WATER LEVEL Dry

LITHOLOGIC DESCRIPTION AND REMARKS

WELL CONST	DEPTH (~Ft.)	COLOR	TEXTURE	OBSERVATIONS	PID ppm	TCE RESULT ppm
	0.0-0.5	Gray	gravel	loose gravely Fill	0.2	
	0.5-1.0	"	"	"	0.7	
	1.0-1.5	Red	Clay	Tight red clay	1.0	
	1.5-2.0	"	"	"	0.6	
	2.0-2.5	"	"	"	0.5	
	2.5-3.0	not identify	clay/Rock	clay/Rock mix	0.1	
	3.0-3.5	Red	Clay	Tight red clay	0.0	
	3.5-4.0				0.0	
	4.0-4.5				0.0	
	4.5-5.0				0.2	
	5.0-5.5				0.0	
	5.5-6.0				0.7	
	6.0-6.5				1.4	
	6.5-7.0				1.4	
	7.0-7.5				1.3	
	7.5-8.0				0.7	
	8.0-8.5				1.3	ND
	8.5-9.0				1.2	
	9.0-9.5				0.0	
	9.5-10				0.0	
	10.0-10.5	—	—	—	1.1	
	10.5-11.0	Red	clay/Rock	clay/Rock mix	1.6	
	11.0-11.5	"	"	"	4.0	
	11.5-12.0	"	"	"	5.4	
	12.0-12.5	Red	Clay	Tight red clay	4.8	
	12.5-13.0	"	"	"	4.6	
	13.0-13.5	"	"	"	6.8	
	13.5-14.0	"	"	"	5.6	
	14.0-14.5	"	"	"	0.0	
	14.5-15.0	"	"	"	1.0	
	15.0-15.5	"	"	"	0.7	
	15.5-16.0	"	"	"	0.6	
	16.0-16.5	gray	Rock	small Rock Mix	0.1	
	16.5-17.0	Red	Clay	Tight Red Clay	0.0	ND
	17.0-17.5					

ST #	SOIL BORING LOG	BORING # SB- 05
R #	INVESTIGATOR Ken Hannon	DRILLER Ken Hannon
SITE NAME Dawson Metals #2	DRILLING METHOD Direct Push	SAMPLING METHOD Solid Tube
SITE ADDRESS Camdenton	BOREHOLE DIA. 2 inches	SAMPLING INTERVAL
DATE OF BORING 10/3/17	TOTAL BORING DEPTH 12.0'	STATIC WATER LEVEL Dry

LITHOLOGIC DESCRIPTION AND REMARKS

WELL CONST	DEPTH (~Ft)	COLOR	TEXTURE	OBSERVATIONS	PID ppm	TCE RESULT ppm
	0.0-0.5	Gray	gravel	loose gravely fill	1.1	
	0.5-1.0	⊥	⊥	⊥	0.0	
	1.0-1.5	Brown/gray	Clay	Tight brownish gray clay	0.7	
	1.5-2.0				0.7	
	2.0-2.5				1.1	
	2.5-3.0				0.4	
	3.0-3.5				1.0	
	3.5-4.0	No info.	Clay/Rock	Clay rock mix	1.3	
	4.0-4.5	Red	Clay	Tight red clay	0.9	
	4.5-5.0				0.0	
	5.0-5.5				0.0	
	5.5-6.0				1.8	
	6.0-6.5				1.5	
	6.5-7.0				0.8	
	7.0-7.5				1.7	
	7.5-8.0				2.8	
	8.0-8.5				3.4	NA
	8.5-9.0				2.7	
	9.0-9.5				0.0	
	9.5-10				0.0	
	10.0-10.5				1.0	
	10.5-11.0				0.6	
	11.0-11.5				0.5	
	11.5-12.0	⊥	⊥	⊥	0.0	NA
	12.0-12.5					
	12.5-13.0					
	13.0-13.5					
	13.5-14.0					
	14.0-14.5					
	14.5-15.0					
	15.0-15.5					
	15.5-16.0					
	16.0-16.5					
	16.5-17.0					
	17.0-17.5					

ST #	SOIL BORING LOG	BORING # SB- 06
R #	INVESTIGATOR Ken Hannon	DRILLER Ken Hannon
SITE NAME Dawson Metals #2	DRILLING METHOD Direct Push	SAMPLING METHOD Solid Tube
SITE ADDRESS Camdenton	BOREHOLE DIA. 2 inches	SAMPLING INTERVAL
DATE OF BORING 10/4/17	TOTAL BORING DEPTH 17'	STATIC WATER LEVEL Dry

LITHOLOGIC DESCRIPTION AND REMARKS

WELL CONST	DEPTH (~Ft.)	COLOR	TEXTURE	OBSERVATIONS	PID ppm	TCE RESULT ppm
	0.0-0.5	Gray	gravel	loose gravely fill	0.9	
	0.5-1.0				1.3	
	1.0-1.5				1.1	
	1.5-2.0	Red	clay/gravel	loose gravely red clay	0.6	
	2.0-2.5				0.6	
	2.5-3.0				0.9	
	3.0-3.5				1.3	
	3.5-4.0	Red	Clay	Tight Red Clay	0.6	
	4.0-4.5				0.9	
	4.5-5.0				0.6	
	5.0-5.5	Gray	Rock	Rock lens	0.6	
	5.5-6.0	Red	Clay	Tight red clay	3.2	
	6.0-6.5				2.8	
	6.5-7.0				2.7	
	7.0-7.5				3.5	
	7.5-8.0				3.7	
	8.0-8.5				4.1	
	8.5-9.0				4.1	
	9.0-9.5				3.2	
	9.5-10				0.7	
	10.0-10.5				1.7	
	10.5-11.0				3.0	
	11.0-11.5				4.5	ND
	11.5-12.0		Clay/Rock	Red clay / Rock mix	3.7	
	12.0-12.5				3.8	
	12.5-13.0				3.9	
	13.0-13.5				2.0	
	13.5-14.0				1.0	
	14.0-14.5				0.6	
	14.5-15.0				0.6	
	15.0-15.5				2.6	
	15.5-16.0				2.8	
	16.0-16.5	Gray	Rock	Rock lens	3.8	
	16.5-17.0	Red	Clay	Tight red clay	0.3	ND
	17.0-17.5					

ST #	SOIL BORING LOG	BORING # SB-07
R #	INVESTIGATOR Ken Hannon	DRILLER Ken Hannon
SITE NAME Dawson Metals #2	DRILLING METHOD Direct Push	SAMPLING METHOD Solid Tube
SITE ADDRESS Camdenton	BOREHOLE DIA. 2 inches	SAMPLING INTERVAL
DATE OF BORING 10/4/17	TOTAL BORING DEPTH 14'	STATIC WATER LEVEL Dry

LITHOLOGIC DESCRIPTION AND REMARKS

WELL CONST	DEPTH (~Ft.)	COLOR	TEXTURE	OBSERVATIONS	PID ppm	TCE RESULT ppm
	0.0-0.5	Gray	gravel	loose gravely Fill	233	
	0.5-1.0	Brown	Clay	Tight brown clay	125.2	77
	1.0-1.5				40.6	
	1.5-2.0				29.7	
	2.0-2.5				20.6	
	2.5-3.0				12.8	
	3.0-3.5				3.7	
	3.5-4.0	Red		Tight Red Clay	3.7	
	4.0-4.5				5.0	
	4.5-5.0				1.0	
	5.0-5.5				2.6	
	5.5-6.0				1057	483
	6.0-6.5				752	
	6.5-7.0	Gray	Rock	Rock lens	357	
	7.0-7.5	Red	Clay	Tight Red Clay	106.5	
	7.5-8.0				9.1	
	8.0-8.5				5.0	
	8.5-9.0				4.7	
	9.0-9.5				5.2	
	9.5-10				4.7	
	10.0-10.5				176	
	10.5-11.0				360.6	
	11.0-11.5				731	
	11.5-12.0				935	
	12.0-12.5				933.8	
	12.5-13.0				1209	313/390
	13.0-13.5				1197	
	13.5-14.0				1.2	
	14.0-14.5					
	14.5-15.0					
	15.0-15.5					
	15.5-16.0					
	16.0-16.5					
	16.5-17.0					
	17.0-17.5					

ST #	SOIL BORING LOG	BORING # SB-08
R #	INVESTIGATOR Ken Hannon	DRILLER Ken Hannon
SITE NAME Dawson Metals #2	DRILLING METHOD Direct Push	SAMPLING METHOD Solid Tube
SITE ADDRESS Camdenton	BOREHOLE DIA. 2 inches	SAMPLING INTERVAL
DATE OF BORING 10/4/17	TOTAL BORING DEPTH 15'	STATIC WATER LEVEL Dry

LITHOLOGIC DESCRIPTION AND REMARKS

WELL CONST	DEPTH (~Ft)	COLOR	TEXTURE	OBSERVATIONS	PID ppm	TCE RESULT ppm
	0.0-0.5	Gray	gravel	Gravelly Fill	2.5	
	0.5-1.0	⊥	⊥	⊥	3.4	
	1.0-1.5	Gray	Clay/Silt	Gray silty Clay	12.2	
	1.5-2.0				14.9	
	2.0-2.5				14.3	
	2.5-3.0				11.7	
	3.0-3.5		Clay	loose gray Clay	0.3	
	3.5-4.0	~~Red~~		~~Tight red clay~~	0.4	
	4.0-4.5				0.4	
	4.5-5.0			⊥	0.4	
	5.0-5.5	Red	Clay	Tight Red Clay	8.7	
	5.5-6.0				31.6	
	6.0-6.5				35.6	
	6.5-7.0				34.2	
	7.0-7.5				32.7	
	7.5-8.0				37.2	
	8.0-8.5				37.2	
	8.5-9.0				36.7	
	9.0-9.5				0.2	
	9.5-10				0.4	
	10.0-10.5				34.0	
	10.5-11.0				44.8	55
	11.0-11.5				42.6	
	11.5-12.0			⊥	16.5	
	12.0-12.5	Red	Sand/Clay	Sandy Clay	9.3	
	12.5-13.0		~~Sa~~ Clay	Tight Red Clay	16.9	
	13.0-13.5				49.2	97
	13.5-14.0				16.9	
	14.0-14.5				0.2	
	14.5-15.0	Gray	Rock	Weathered Bedrock	3.4	
	15.0-15.5					
	15.5-16.0					
	16.0-16.5					
	16.5-17.0					
	17.0-17.5					

ST #	SOIL BORING LOG	BORING # SB- 09
R #	INVESTIGATOR Ken Hannon	DRILLER Ken Hannon
SITE NAME Dawson Metals #2	DRILLING METHOD Direct Push	SAMPLING METHOD Solid Tube
SITE ADDRESS Camdenton	BOREHOLE DIA. 2 inches	SAMPLING INTERVAL
DATE OF BORING 10/4/17	TOTAL BORING DEPTH 15'	STATIC WATER LEVEL Dry

LITHOLOGIC DESCRIPTION AND REMARKS

WELL CONST	DEPTH (~Ft.)	COLOR	TEXTURE	OBSERVATIONS	PID ppm	TCE RESULT ppm
	0.0-0.5	Gray	Gravel	loose gravely mix	1.9	
	0.5-1.0				2.4	
	1.0-1.5				1.4	
	1.5-2.0				5.1	
	2.0-2.5		clay/gravel	Gray clay/gravel mix	13.8	
	2.5-3.0		Clay	loose gray clay	14.8	
	3.0-3.5		Clay/Rock	gray clay/Rock mix	12.8	
	3.5-4.0		Clay	Medium gray clay	2.1	
	4.0-4.5				0.5	
	4.5-5.0				0.7	
	5.0-5.5				19.0	
	5.5-6.0				19.3	
	6.0-6.5				20.0	22
	6.5-7.0				20.2	
	7.0-7.5	Red		Tight Red Clay	17.6	
	7.5-8.0				15.4	
	8.0-8.5				19.6	
	8.5-9.0				11.1	
	9.0-9.5				3.6	
	9.5-10				3.4	
	10.0-10.5				6.9	
	10.5-11.0				21.0	
	11.0-11.5				20.0	
	11.5-12.0	Brown	Sand	Sand lense	19.2	
	12.0-12.5				10.0	
	12.5-13.0	Red	Clay	Tight red clay	5.1	
	13.0-13.5				27.3	
	13.5-14.0				30.0	18
	14.0-14.5				0.0	
	14.5-15.0				0.0	
	15.0-15.5					
	15.5-16.0					
	16.0-16.5					
	16.5-17.0					
	17.0-17.5					

eurofins | Air Toxics

10/18/2017
Mr. Ken Hannon
Missouri Dept. of Natural Resources
2710 West Main

Jefferson City MO 65109

Project Name: Dawson Metals
Project #:
Workorder #: 1710210

Dear Mr. Ken Hannon

The following report includes the data for the above referenced project for sample(s) received on 10/11/2017 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 SIM are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Brian Whittaker at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Brian Whittaker

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1710210

Work Order Summary

CLIENT:	Mr. Ken Hannon Missouri Dept. of Natural Resources 2710 West Main Jefferson City, MO 65109	**BILL TO:**	Accounts Payable Missouri Dept. of Natural Resources P.O Box 176 Jefferson City, MO 65102
PHONE:	573-526-3363	**P.O. #**	3ESP180259
FAX:	573-526-3350	**PROJECT #**	Dawson Metals
DATE RECEIVED:	10/11/2017	**CONTACT:**	Brian Whittaker
DATE COMPLETED:	10/18/2017		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	IA-01 #173782 Room 1 West End	Modified TO-15 SIM	4.5 "Hg	5.1 psi
02A	IA-01 #173783 Room 1 co-located	Modified TO-15 SIM	3.1 "Hg	5 psi
03A	IA-02 #173784 Room 1 shelving	Modified TO-15 SIM	8.8 "Hg	5.1 psi
04A	IA-03 #173785 Room 2-middle shelf	Modified TO-15 SIM	6.3 "Hg	4.9 psi
05A	IA-04 #173786 Room 3-middle shelf	Modified TO-15 SIM	4.3 "Hg	4.7 psi
06A	IA-05 #173787 Room 4-	Modified TO-15 SIM	6.3 "Hg	5 psi
07A	IA-06 #173788 Room 5-Middle of Room	Modified TO-15 SIM	5.3 "Hg	5.1 psi
08A	IA-07 #173789 Room 6-workstation shelf	Modified TO-15 SIM	6.3 "Hg	5 psi
09A	IA-08 #173790 Room 6-SE corner shelf	Modified TO-15 SIM	5.5 "Hg	5.1 psi
10A	IA-09 #173791 Room 7-middle of Room wo	Modified TO-15 SIM	4.9 "Hg	5.2 psi
11A	Lab Blank	Modified TO-15 SIM	NA	NA
11B	Lab Blank	Modified TO-15 SIM	NA	NA
11C	Lab Blank	Modified TO-15 SIM	NA	NA
12A	CCV	Modified TO-15 SIM	NA	NA
12B	CCV	Modified TO-15 SIM	NA	NA
12C	CCV	Modified TO-15 SIM	NA	NA
13A	LCS	Modified TO-15 SIM	NA	NA
13AA	LCSD	Modified TO-15 SIM	NA	NA
13B	LCS	Modified TO-15 SIM	NA	NA
13BB	LCSD	Modified TO-15 SIM	NA	NA
13C	LCS	Modified TO-15 SIM	NA	NA
13CC	LCSD	Modified TO-15 SIM	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 10/18/17

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

LABORATORY NARRATIVE
Modified TO-15 SIM
Missouri Dept. of Natural Resources
Workorder# 1710210

Ten 6 Liter Summa Canister (SIM Certified) samples were received on October 11, 2017. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the SIM acquisition mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	***TO-15***	***ATL Modifications***
ICAL %RSD acceptance criteria	</=30% RSD with 2 compounds allowed out to < 40% RSD	Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD
Daily Calibration	+- 30% Difference	Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers
Blank and standards	Zero air	Nitrogen
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

The Chain of Custody (COC) information for sample IA-09 #173791 Room 7-middle of Room work shelf did not match the information on the canister with regard to canister identification. The client was notified of the discrepancy and the information on the canister was used to process and report the sample.

Analytical Notes

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page (analytical batch from 10/12/17).

The Relative Percent Difference (RPD) of the LCS/LCSD exceeded acceptance limits for Chloroethane (analytical batch from 10/16/17).

Dilution was performed on sample IA-05 #173787 Room 4- due to the presence of high level target species.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

eurofins | Air Toxics

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: IA-01 #173782 Room 1 West End

Lab ID#: 1710210-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.032	0.41	0.16	2.0
Carbon Tetrachloride	0.032	0.079	0.20	0.50
Benzene	0.079	0.50	0.25	1.6
Trichloroethene	0.032	0.39	0.17	2.1
Toluene	0.032	1.9	0.12	7.3
Ethyl Benzene	0.032	0.30	0.14	1.3
m,p-Xylene	0.063	0.62	0.27	2.7
o-Xylene	0.032	0.29	0.14	1.2

Client Sample ID: IA-01 #173783 Room 1 co-located

Lab ID#: 1710210-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.030	0.40	0.15	2.0
Carbon Tetrachloride	0.030	0.082	0.19	0.52
Benzene	0.074	0.49	0.24	1.6
Trichloroethene	0.030	0.39	0.16	2.1
Toluene	0.030	1.9	0.11	7.1
Ethyl Benzene	0.030	0.30	0.13	1.3
m,p-Xylene	0.060	0.63	0.26	2.7
o-Xylene	0.030	0.28	0.13	1.2

Client Sample ID: IA-02 #173784 Room 1 shelving

Lab ID#: 1710210-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.038	0.41	0.19	2.0
Carbon Tetrachloride	0.038	0.077	0.24	0.49
Benzene	0.095	0.51	0.30	1.6
Trichloroethene	0.038	0.31	0.20	1.7
Toluene	0.038	1.7	0.14	6.5
Ethyl Benzene	0.038	0.27	0.16	1.2
m,p-Xylene	0.076	0.58	0.33	2.5

eurofins | Air Toxics

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: IA-02 #173784 Room 1 shelving

Lab ID#: 1710210-03A

o-Xylene	0.038	0.27	0.16	1.2

Client Sample ID: IA-03 #173785 Room 2-middle shelf

Lab ID#: 1710210-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.034	0.40	0.17	2.0
Carbon Tetrachloride	0.034	0.077	0.21	0.49
Benzene	0.084	0.32	0.27	1.0
Trichloroethene	0.034	0.15	0.18	0.82
Toluene	0.034	2.4	0.13	9.1
Ethyl Benzene	0.034	0.38	0.15	1.6
m,p-Xylene	0.068	0.78	0.29	3.4
o-Xylene	0.034	0.37	0.15	1.6

Client Sample ID: IA-04 #173786 Room 3-middle shelf

Lab ID#: 1710210-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.031	0.40	0.15	2.0
Vinyl Chloride	0.015	0.018	0.039	0.047
Carbon Tetrachloride	0.031	0.080	0.19	0.50
Benzene	0.077	0.20	0.24	0.64
Trichloroethene	0.031	0.075	0.16	0.40
Toluene	0.031	6.0	0.12	22
Ethyl Benzene	0.031	0.98	0.13	4.2
m,p-Xylene	0.062	2.2	0.27	9.6
o-Xylene	0.031	1.1	0.13	4.7

Client Sample ID: IA-05 #173787 Room 4-

Lab ID#: 1710210-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.085	0.41	0.42	2.0

eurofins | Air Toxics

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: IA-05 #173787 Room 4-

Lab ID#: 1710210-06A

1,2-Dichloroethane	0.085	0.35	0.34	1.4
Toluene	0.085	8.0	0.32	30
Ethyl Benzene	0.085	10	0.37	46
m,p-Xylene	0.17	32	0.74	140
o-Xylene	0.085	16	0.37	71

Client Sample ID: IA-06 #173788 Room 5-Middle of Room

Lab ID#: 1710210-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.033	0.41	0.16	2.0
Carbon Tetrachloride	0.033	0.082	0.21	0.51
Benzene	0.082	0.085	0.26	0.27
1,2-Dichloroethane	0.033	0.074	0.13	0.30
Toluene	0.033	8.4	0.12	32
Ethyl Benzene	0.033	2.7	0.14	12
m,p-Xylene	0.066	6.7	0.28	29
o-Xylene	0.033	3.0	0.14	13

Client Sample ID: IA-07 #173789 Room 6-workstation shelf

Lab ID#: 1710210-08A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.034	0.39	0.17	1.9
Carbon Tetrachloride	0.034	0.078	0.21	0.49
Benzene	0.085	0.093	0.27	0.30
1,2-Dichloroethane	0.034	0.070	0.14	0.28
Toluene	0.034	5.3	0.13	20
Ethyl Benzene	0.034	2.2	0.15	9.6
m,p-Xylene	0.068	5.8	0.30	25
o-Xylene	0.034	2.8	0.15	12

Client Sample ID: IA-08 #173790 Room 6-SE corner shelf

Lab ID#: 1710210-09A

eurofins | Air Toxics

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: IA-08 #173790 Room 6-SE corner shelf

Lab ID#: 1710210-09A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.033	0.41	0.16	2.0
Vinyl Chloride	0.016	0.016	0.042	0.042
Carbon Tetrachloride	0.033	0.080	0.21	0.50
1,2-Dichloroethane	0.033	0.085	0.13	0.34
Toluene	0.033	5.2	0.12	20
Ethyl Benzene	0.033	2.8	0.14	12
m,p-Xylene	0.066	7.8	0.29	34
o-Xylene	0.033	3.8	0.14	16

Client Sample ID: IA-09 #173791 Room 7-middle of Room work shelf

Lab ID#: 1710210-10A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.032	0.40	0.16	2.0
Vinyl Chloride	0.016	0.065	0.041	0.17
Carbon Tetrachloride	0.032	0.072	0.20	0.45
Benzene	0.081	0.15	0.26	0.48
1,2-Dichloroethane	0.032	0.098	0.13	0.40
Toluene	0.032	7.5	0.12	28
Ethyl Benzene	0.032	3.1	0.14	14
m,p-Xylene	0.065	8.1	0.28	35
o-Xylene	0.032	3.9	0.14	17

eurofins | Air Toxics

Client Sample ID: IA-01 #173782 Room 1 West End

Lab ID#: 1710210-01A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101215sim**	**Date of Collection: 10/2/17 3:25:00 PM**	
Dil. Factor:	**1.58**	**Date of Analysis: 10/12/17 08:58 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.032	0.41	0.16	2.0
Freon 114	0.032	Not Detected	0.22	Not Detected
Chloromethane	0.79	Not Detected	1.6	Not Detected
Vinyl Chloride	0.016	Not Detected	0.040	Not Detected
Chloroethane	0.079	Not Detected	0.21	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.063	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Methyl tert-butyl ether	0.16	Not Detected	0.57	Not Detected
1,1-Dichloroethane	0.032	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.12	Not Detected
Chloroform	0.032	Not Detected	0.15	Not Detected
1,1,1-Trichloroethane	0.032	Not Detected	0.17	Not Detected
Carbon Tetrachloride	0.032	0.079	0.20	0.50
Benzene	0.079	0.50	0.25	1.6
1,2-Dichloroethane	0.032	Not Detected	0.13	Not Detected
Trichloroethene	0.032	0.39	0.17	2.1
Toluene	0.032	1.9	0.12	7.3
1,1,2-Trichloroethane	0.032	Not Detected	0.17	Not Detected
Tetrachloroethene	0.032	Not Detected	0.21	Not Detected
1,2-Dibromoethane (EDB)	0.032	Not Detected	0.24	Not Detected
Ethyl Benzene	0.032	0.30	0.14	1.3
m,p-Xylene	0.063	0.62	0.27	2.7
o-Xylene	0.032	0.29	0.14	1.2
1,1,2,2-Tetrachloroethane	0.032	Not Detected	0.22	Not Detected
1,4-Dichlorobenzene	0.032	Not Detected UJ	0.19	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	101	70-130

eurofins | Air Toxics

Client Sample ID: IA-01 #173783 Room 1 co-located

Lab ID#: 1710210-02A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101216sim**	**Date of Collection: 10/2/17 3:25:00 PM**	
Dil. Factor:	**1.49**	**Date of Analysis: 10/12/17 09:38 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.030	0.40	0.15	2.0
Freon 114	0.030	Not Detected	0.21	Not Detected
Chloromethane	0.74	Not Detected	1.5	Not Detected
Vinyl Chloride	0.015	Not Detected	0.038	Not Detected
Chloroethane	0.074	Not Detected	0.20	Not Detected
1,1-Dichloroethene	0.015	Not Detected	0.059	Not Detected
trans-1,2-Dichloroethene	0.15	Not Detected	0.59	Not Detected
Methyl tert-butyl ether	0.15	Not Detected	0.54	Not Detected
1,1-Dichloroethane	0.030	Not Detected	0.12	Not Detected
cis-1,2-Dichloroethene	0.030	Not Detected	0.12	Not Detected
Chloroform	0.030	Not Detected	0.14	Not Detected
1,1,1-Trichloroethane	0.030	Not Detected	0.16	Not Detected
Carbon Tetrachloride	0.030	0.082	0.19	0.52
Benzene	0.074	0.49	0.24	1.6
1,2-Dichloroethane	0.030	Not Detected	0.12	Not Detected
Trichloroethene	0.030	0.39	0.16	2.1
Toluene	0.030	1.9	0.11	7.1
1,1,2-Trichloroethane	0.030	Not Detected	0.16	Not Detected
Tetrachloroethene	0.030	Not Detected	0.20	Not Detected
1,2-Dibromoethane (EDB)	0.030	Not Detected	0.23	Not Detected
Ethyl Benzene	0.030	0.30	0.13	1.3
m,p-Xylene	0.060	0.63	0.26	2.7
o-Xylene	0.030	0.28	0.13	1.2
1,1,2,2-Tetrachloroethane	0.030	Not Detected	0.20	Not Detected
1,4-Dichlorobenzene	0.030	Not Detected UJ	0.18	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	101	70-130

eurofins | Air Toxics

Client Sample ID: IA-02 #173784 Room 1 shelving

Lab ID#: 1710210-03A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101217sim**	**Date of Collection: 10/2/17 3:29:00 PM**	
Dil. Factor:	**1.90**	**Date of Analysis: 10/12/17 10:13 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.038	0.41	0.19	2.0
Freon 114	0.038	Not Detected	0.26	Not Detected
Chloromethane	0.95	Not Detected	2.0	Not Detected
Vinyl Chloride	0.019	Not Detected	0.048	Not Detected
Chloroethane	0.095	Not Detected	0.25	Not Detected
1,1-Dichloroethene	0.019	Not Detected	0.075	Not Detected
trans-1,2-Dichloroethene	0.19	Not Detected	0.75	Not Detected
Methyl tert-butyl ether	0.19	Not Detected	0.68	Not Detected
1,1-Dichloroethane	0.038	Not Detected	0.15	Not Detected
cis-1,2-Dichloroethene	0.038	Not Detected	0.15	Not Detected
Chloroform	0.038	Not Detected	0.18	Not Detected
1,1,1-Trichloroethane	0.038	Not Detected	0.21	Not Detected
Carbon Tetrachloride	0.038	0.077	0.24	0.49
Benzene	0.095	0.51	0.30	1.6
1,2-Dichloroethane	0.038	Not Detected	0.15	Not Detected
Trichloroethene	0.038	0.31	0.20	1.7
Toluene	0.038	1.7	0.14	6.5
1,1,2-Trichloroethane	0.038	Not Detected	0.21	Not Detected
Tetrachloroethene	0.038	Not Detected	0.26	Not Detected
1,2-Dibromoethane (EDB)	0.038	Not Detected	0.29	Not Detected
Ethyl Benzene	0.038	0.27	0.16	1.2
m,p-Xylene	0.076	0.58	0.33	2.5
o-Xylene	0.038	0.27	0.16	1.2
1,1,2,2-Tetrachloroethane	0.038	Not Detected	0.26	Not Detected
1,4-Dichlorobenzene	0.038	Not Detected UJ	0.23	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	101	70-130

eurofins | Air Toxics

Client Sample ID: IA-03 #173785 Room 2-middle shelf

Lab ID#: 1710210-04A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101218sim**	**Date of Collection: 10/2/17 3:34:00 PM**	
Dil. Factor:	**1.69**	**Date of Analysis: 10/12/17 10:49 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.034	0.40	0.17	2.0
Freon 114	0.034	Not Detected	0.24	Not Detected
Chloromethane	0.84	Not Detected	1.7	Not Detected
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
Chloroethane	0.084	Not Detected	0.22	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.067	Not Detected
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Methyl tert-butyl ether	0.17	Not Detected	0.61	Not Detected
1,1-Dichloroethane	0.034	Not Detected	0.14	Not Detected
cis-1,2-Dichloroethene	0.034	Not Detected	0.13	Not Detected
Chloroform	0.034	Not Detected	0.16	Not Detected
1,1,1-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Carbon Tetrachloride	0.034	0.077	0.21	0.49
Benzene	0.084	0.32	0.27	1.0
1,2-Dichloroethane	0.034	Not Detected	0.14	Not Detected
Trichloroethene	0.034	0.15	0.18	0.82
Toluene	0.034	2.4	0.13	9.1
1,1,2-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Tetrachloroethene	0.034	Not Detected	0.23	Not Detected
1,2-Dibromoethane (EDB)	0.034	Not Detected	0.26	Not Detected
Ethyl Benzene	0.034	0.38	0.15	1.6
m,p-Xylene	0.068	0.78	0.29	3.4
o-Xylene	0.034	0.37	0.15	1.6
1,1,2,2-Tetrachloroethane	0.034	Not Detected	0.23	Not Detected
1,4-Dichlorobenzene	0.034	Not Detected UJ	0.20	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	99	70-130

eurofins | Air Toxics

Client Sample ID: IA-04 #173786 Room 3-middle shelf

Lab ID#: 1710210-05A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101219sim**	**Date of Collection: 10/2/17 3:36:00 PM**	
Dil. Factor:	**1.54**	**Date of Analysis: 10/13/17 05:40 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.031	0.40	0.15	2.0
Freon 114	0.031	Not Detected	0.22	Not Detected
Chloromethane	0.77	Not Detected	1.6	Not Detected
Vinyl Chloride	0.015	0.018	0.039	0.047
Chloroethane	0.077	Not Detected	0.20	Not Detected
1,1-Dichloroethene	0.015	Not Detected	0.061	Not Detected
trans-1,2-Dichloroethene	0.15	Not Detected	0.61	Not Detected
Methyl tert-butyl ether	0.15	Not Detected	0.56	Not Detected
1,1-Dichloroethane	0.031	Not Detected	0.12	Not Detected
cis-1,2-Dichloroethene	0.031	Not Detected	0.12	Not Detected
Chloroform	0.031	Not Detected	0.15	Not Detected
1,1,1-Trichloroethane	0.031	Not Detected	0.17	Not Detected
Carbon Tetrachloride	0.031	0.080	0.19	0.50
Benzene	0.077	0.20	0.24	0.64
1,2-Dichloroethane	0.031	Not Detected	0.12	Not Detected
Trichloroethene	0.031	0.075	0.16	0.40
Toluene	0.031	6.0	0.12	22
1,1,2-Trichloroethane	0.031	Not Detected	0.17	Not Detected
Tetrachloroethene	0.031	Not Detected	0.21	Not Detected
1,2-Dibromoethane (EDB)	0.031	Not Detected	0.24	Not Detected
Ethyl Benzene	0.031	0.98	0.13	4.2
m,p-Xylene	0.062	2.2	0.27	9.6
o-Xylene	0.031	1.1	0.13	4.7
1,1,2,2-Tetrachloroethane	0.031	Not Detected	0.21	Not Detected
1,4-Dichlorobenzene	0.031	Not Detected UJ	0.18	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	99	70-130

eurofins | Air Toxics

Client Sample ID: IA-05 #173787 Room 4-

Lab ID#: 1710210-06A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101625sim**	**Date of Collection:**	**10/2/17 3:43:00 PM**
Dil. Factor:	**4.25**	**Date of Analysis:**	**10/17/17 07:39 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.085	0.41	0.42	2.0
Freon 114	0.085	Not Detected	0.59	Not Detected
Chloromethane	2.1	Not Detected	4.4	Not Detected
Vinyl Chloride	0.042	Not Detected	0.11	Not Detected
Chloroethane	0.21	Not Detected	0.56	Not Detected
1,1-Dichloroethene	0.042	Not Detected	0.17	Not Detected
trans-1,2-Dichloroethene	0.42	Not Detected	1.7	Not Detected
Methyl tert-butyl ether	0.42	Not Detected	1.5	Not Detected
1,1-Dichloroethane	0.085	Not Detected	0.34	Not Detected
cis-1,2-Dichloroethene	0.085	Not Detected	0.34	Not Detected
Chloroform	0.085	Not Detected	0.42	Not Detected
1,1,1-Trichloroethane	0.085	Not Detected	0.46	Not Detected
Carbon Tetrachloride	0.085	Not Detected	0.53	Not Detected
Benzene	0.21	Not Detected	0.68	Not Detected
1,2-Dichloroethane	0.085	0.35	0.34	1.4
Trichloroethene	0.085	Not Detected	0.46	Not Detected
Toluene	0.085	8.0	0.32	30
1,1,2-Trichloroethane	0.085	Not Detected	0.46	Not Detected
Tetrachloroethene	0.085	Not Detected	0.58	Not Detected
1,2-Dibromoethane (EDB)	0.085	Not Detected	0.65	Not Detected
Ethyl Benzene	0.085	10	0.37	46
m,p-Xylene	0.17	32	0.74	140
o-Xylene	0.085	16	0.37	71
1,1,2,2-Tetrachloroethane	0.085	Not Detected	0.58	Not Detected
1,4-Dichlorobenzene	0.085	Not Detected	0.51	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	99	70-130

eurofins | Air Toxics

Client Sample ID: IA-06 #173788 Room 5-Middle of Room

Lab ID#: 1710210-07A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101220sim**	**Date of Collection:**	**10/2/17 3:46:00 PM**
Dil. Factor:	**1.64**	**Date of Analysis:**	**10/13/17 06:16 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.033	0.41	0.16	2.0
Freon 114	0.033	Not Detected	0.23	Not Detected
Chloromethane	0.82	Not Detected	1.7	Not Detected
Vinyl Chloride	0.016	Not Detected	0.042	Not Detected
Chloroethane	0.082	Not Detected	0.22	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.065	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Methyl tert-butyl ether	0.16	Not Detected	0.59	Not Detected
1,1-Dichloroethane	0.033	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.033	Not Detected	0.13	Not Detected
Chloroform	0.033	Not Detected	0.16	Not Detected
1,1,1-Trichloroethane	0.033	Not Detected	0.18	Not Detected
Carbon Tetrachloride	0.033	0.082	0.21	0.51
Benzene	0.082	0.085	0.26	0.27
1,2-Dichloroethane	0.033	0.074	0.13	0.30
Trichloroethene	0.033	Not Detected	0.18	Not Detected
Toluene	0.033	8.4	0.12	32
1,1,2-Trichloroethane	0.033	Not Detected	0.18	Not Detected
Tetrachloroethene	0.033	Not Detected	0.22	Not Detected
1,2-Dibromoethane (EDB)	0.033	Not Detected	0.25	Not Detected
Ethyl Benzene	0.033	2.7	0.14	12
m,p-Xylene	0.066	6.7	0.28	29
o-Xylene	0.033	3.0	0.14	13
1,1,2,2-Tetrachloroethane	0.033	Not Detected	0.22	Not Detected
1,4-Dichlorobenzene	0.033	Not Detected UJ	0.20	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: IA-07 #173789 Room 6-workstation shelf

Lab ID#: 1710210-08A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101221sim**	**Date of Collection: 10/2/17 3:48:00 PM**	
Dil. Factor:	**1.70**	**Date of Analysis: 10/13/17 06:52 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.034	0.39	0.17	1.9
Freon 114	0.034	Not Detected	0.24	Not Detected
Chloromethane	0.85	Not Detected	1.8	Not Detected
Vinyl Chloride	0.017	Not Detected	0.043	Not Detected
Chloroethane	0.085	Not Detected	0.22	Not Detected
1,1-Dichloroethene	0.017	Not Detected	0.067	Not Detected
trans-1,2-Dichloroethene	0.17	Not Detected	0.67	Not Detected
Methyl tert-butyl ether	0.17	Not Detected	0.61	Not Detected
1,1-Dichloroethane	0.034	Not Detected	0.14	Not Detected
cis-1,2-Dichloroethene	0.034	Not Detected	0.13	Not Detected
Chloroform	0.034	Not Detected	0.17	Not Detected
1,1,1-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Carbon Tetrachloride	0.034	0.078	0.21	0.49
Benzene	0.085	0.093	0.27	0.30
1,2-Dichloroethane	0.034	0.070	0.14	0.28
Trichloroethene	0.034	Not Detected	0.18	Not Detected
Toluene	0.034	5.3	0.13	20
1,1,2-Trichloroethane	0.034	Not Detected	0.18	Not Detected
Tetrachloroethene	0.034	Not Detected	0.23	Not Detected
1,2-Dibromoethane (EDB)	0.034	Not Detected	0.26	Not Detected
Ethyl Benzene	0.034	2.2	0.15	9.6
m,p-Xylene	0.068	5.8	0.30	25
o-Xylene	0.034	2.8	0.15	12
1,1,2,2-Tetrachloroethane	0.034	Not Detected	0.23	Not Detected
1,4-Dichlorobenzene	0.034	Not Detected UJ	0.20	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: IA-08 #173790 Room 6-SE corner shelf

Lab ID#: 1710210-09A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101707sim**	**Date of Collection:**	**10/2/17 3:49:00 PM**
Dil. Factor:	**1.65**	**Date of Analysis:**	**10/17/17 03:22 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.033	0.41	0.16	2.0
Freon 114	0.033	Not Detected	0.23	Not Detected
Chloromethane	0.82	Not Detected	1.7	Not Detected
Vinyl Chloride	0.016	0.016	0.042	0.042
Chloroethane	0.082	Not Detected	0.22	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.065	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.65	Not Detected
Methyl tert-butyl ether	0.16	Not Detected	0.59	Not Detected
1,1-Dichloroethane	0.033	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.033	Not Detected	0.13	Not Detected
Chloroform	0.033	Not Detected	0.16	Not Detected
1,1,1-Trichloroethane	0.033	Not Detected	0.18	Not Detected
Carbon Tetrachloride	0.033	0.080	0.21	0.50
Benzene	0.082	Not Detected	0.26	Not Detected
1,2-Dichloroethane	0.033	0.085	0.13	0.34
Trichloroethene	0.033	Not Detected	0.18	Not Detected
Toluene	0.033	5.2	0.12	20
1,1,2-Trichloroethane	0.033	Not Detected	0.18	Not Detected
Tetrachloroethene	0.033	Not Detected	0.22	Not Detected
1,2-Dibromoethane (EDB)	0.033	Not Detected	0.25	Not Detected
Ethyl Benzene	0.033	2.8	0.14	12
m,p-Xylene	0.066	7.8	0.29	34
o-Xylene	0.033	3.8	0.14	16
1,1,2,2-Tetrachloroethane	0.033	Not Detected	0.23	Not Detected
1,4-Dichlorobenzene	0.033	Not Detected	0.20	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	96	70-130

eurofins | Air Toxics

Client Sample ID: IA-09 #173791 Room 7-middle of Room work shelf

Lab ID#: 1710210-10A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101626sim**	**Date of Collection:**	**10/2/17 3:51:00 PM**
Dil. Factor:	**1.62**	**Date of Analysis:**	**10/17/17 08:21 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.032	0.40	0.16	2.0
Freon 114	0.032	Not Detected	0.23	Not Detected
Chloromethane	0.81	Not Detected	1.7	Not Detected
Vinyl Chloride	0.016	0.065	0.041	0.17
Chloroethane	0.081	Not Detected	0.21	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.064	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.64	Not Detected
Methyl tert-butyl ether	0.16	Not Detected	0.58	Not Detected
1,1-Dichloroethane	0.032	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.13	Not Detected
Chloroform	0.032	Not Detected	0.16	Not Detected
1,1,1-Trichloroethane	0.032	Not Detected	0.18	Not Detected
Carbon Tetrachloride	0.032	0.072	0.20	0.45
Benzene	0.081	0.15	0.26	0.48
1,2-Dichloroethane	0.032	0.098	0.13	0.40
Trichloroethene	0.032	Not Detected	0.17	Not Detected
Toluene	0.032	7.5	0.12	28
1,1,2-Trichloroethane	0.032	Not Detected	0.18	Not Detected
Tetrachloroethene	0.032	Not Detected	0.22	Not Detected
1,2-Dibromoethane (EDB)	0.032	Not Detected	0.25	Not Detected
Ethyl Benzene	0.032	3.1	0.14	14
m,p-Xylene	0.065	8.1	0.28	35
o-Xylene	0.032	3.9	0.14	17
1,1,2,2-Tetrachloroethane	0.032	Not Detected	0.22	Not Detected
1,4-Dichlorobenzene	0.032	Not Detected	0.19	Not Detected

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	96	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1710210-11A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101206sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/12/17 10:56 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.020	Not Detected	0.099	Not Detected
Freon 114	0.020	Not Detected	0.14	Not Detected
Chloromethane	0.50	Not Detected	1.0	Not Detected
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
Chloroethane	0.050	Not Detected	0.13	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Methyl tert-butyl ether	0.10	Not Detected	0.36	Not Detected
1,1-Dichloroethane	0.020	Not Detected	0.081	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	Not Detected
Chloroform	0.020	Not Detected	0.098	Not Detected
1,1,1-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Carbon Tetrachloride	0.020	Not Detected	0.12	Not Detected
Benzene	0.050	Not Detected	0.16	Not Detected
1,2-Dichloroethane	0.020	Not Detected	0.081	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected
Toluene	0.020	Not Detected	0.075	Not Detected
1,1,2-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Tetrachloroethene	0.020	Not Detected	0.14	Not Detected
1,2-Dibromoethane (EDB)	0.020	Not Detected	0.15	Not Detected
Ethyl Benzene	0.020	Not Detected	0.087	Not Detected
m,p-Xylene	0.040	Not Detected	0.17	Not Detected
o-Xylene	0.020	Not Detected	0.087	Not Detected
1,1,2,2-Tetrachloroethane	0.020	Not Detected	0.14	Not Detected
1,4-Dichlorobenzene	0.020	Not Detected UJ	0.12	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	102	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1710210-11B

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101608sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/16/17 01:32 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.020	Not Detected	0.099	Not Detected
Freon 114	0.020	Not Detected	0.14	Not Detected
Chloromethane	0.50	Not Detected	1.0	Not Detected
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
Chloroethane	0.050	Not Detected	0.13	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Methyl tert-butyl ether	0.10	Not Detected	0.36	Not Detected
1,1-Dichloroethane	0.020	Not Detected	0.081	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	Not Detected
Chloroform	0.020	Not Detected	0.098	Not Detected
1,1,1-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Carbon Tetrachloride	0.020	Not Detected	0.12	Not Detected
Benzene	0.050	Not Detected	0.16	Not Detected
1,2-Dichloroethane	0.020	Not Detected	0.081	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected
Toluene	0.020	Not Detected	0.075	Not Detected
1,1,2-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Tetrachloroethene	0.020	Not Detected	0.14	Not Detected
1,2-Dibromoethane (EDB)	0.020	Not Detected	0.15	Not Detected
Ethyl Benzene	0.020	Not Detected	0.087	Not Detected
m,p-Xylene	0.040	Not Detected	0.17	Not Detected
o-Xylene	0.020	Not Detected	0.087	Not Detected
1,1,2,2-Tetrachloroethane	0.020	Not Detected	0.14	Not Detected
1,4-Dichlorobenzene	0.020	Not Detected	0.12	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	101	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1710210-11C

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101706sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/17/17 02:11 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.020	Not Detected	0.099	Not Detected
Freon 114	0.020	Not Detected	0.14	Not Detected
Chloromethane	0.50	Not Detected	1.0	Not Detected
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
Chloroethane	0.050	Not Detected	0.13	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Methyl tert-butyl ether	0.10	Not Detected	0.36	Not Detected
1,1-Dichloroethane	0.020	Not Detected	0.081	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	Not Detected
Chloroform	0.020	Not Detected	0.098	Not Detected
1,1,1-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Carbon Tetrachloride	0.020	Not Detected	0.12	Not Detected
Benzene	0.050	Not Detected	0.16	Not Detected
1,2-Dichloroethane	0.020	Not Detected	0.081	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected
Toluene	0.020	Not Detected	0.075	Not Detected
1,1,2-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Tetrachloroethene	0.020	Not Detected	0.14	Not Detected
1,2-Dibromoethane (EDB)	0.020	Not Detected	0.15	Not Detected
Ethyl Benzene	0.020	Not Detected	0.087	Not Detected
m,p-Xylene	0.040	Not Detected	0.17	Not Detected
o-Xylene	0.020	Not Detected	0.087	Not Detected
1,1,2,2-Tetrachloroethane	0.020	Not Detected	0.14	Not Detected
1,4-Dichlorobenzene	0.020	Not Detected	0.12	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	104	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1710210-12A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101202sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/12/17 07:29 AM**	

Compound	%Recovery
Freon 12	85
Freon 114	81
Chloromethane	86
Vinyl Chloride	82
Chloroethane	92
1,1-Dichloroethene	82
trans-1,2-Dichloroethene	82
Methyl tert-butyl ether	86
1,1-Dichloroethane	87
cis-1,2-Dichloroethene	84
Chloroform	83
1,1,1-Trichloroethane	83
Carbon Tetrachloride	106
Benzene	80
1,2-Dichloroethane	84
Trichloroethene	78
Toluene	82
1,1,2-Trichloroethane	82
Tetrachloroethene	78
1,2-Dibromoethane (EDB)	86
Ethyl Benzene	84
m,p-Xylene	78
o-Xylene	81
1,1,2,2-Tetrachloroethane	77
1,4-Dichlorobenzene	67 Q

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	96	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1710210-12B

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101604sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/16/17 09:17 AM**	

Compound	%Recovery
Freon 12	84
Freon 114	82
Chloromethane	86
Vinyl Chloride	83
Chloroethane	92
1,1-Dichloroethene	84
trans-1,2-Dichloroethene	83
Methyl tert-butyl ether	89
1,1-Dichloroethane	88
cis-1,2-Dichloroethene	86
Chloroform	84
1,1,1-Trichloroethane	84
Carbon Tetrachloride	114
Benzene	79
1,2-Dichloroethane	83
Trichloroethene	78
Toluene	83
1,1,2-Trichloroethane	83
Tetrachloroethene	78
1,2-Dibromoethane (EDB)	87
Ethyl Benzene	85
m,p-Xylene	78
o-Xylene	81
1,1,2,2-Tetrachloroethane	80
1,4-Dichlorobenzene	70

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	96	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1710210-12C

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101702sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/17/17 10:39 AM**	

Compound	%Recovery
Freon 12	98
Freon 114	94
Chloromethane	100
Vinyl Chloride	95
Chloroethane	106
1,1-Dichloroethene	96
trans-1,2-Dichloroethene	96
Methyl tert-butyl ether	101
1,1-Dichloroethane	101
cis-1,2-Dichloroethene	98
Chloroform	97
1,1,1-Trichloroethane	96
Carbon Tetrachloride	131
Benzene	91
1,2-Dichloroethane	96
Trichloroethene	90
Toluene	95
1,1,2-Trichloroethane	93
Tetrachloroethene	87
1,2-Dibromoethane (EDB)	96
Ethyl Benzene	96
m,p-Xylene	88
o-Xylene	92
1,1,2,2-Tetrachloroethane	87
1,4-Dichlorobenzene	77

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	95	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1710210-13A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101203sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/12/17 08:22 AM**	

Compound	%Recovery	Method Limits
Freon 12	90	70-130
Freon 114	86	70-130
Chloromethane	88	70-130
Vinyl Chloride	86	70-130
Chloroethane	94	70-130
1,1-Dichloroethene	83	70-130
trans-1,2-Dichloroethene	72	70-130
Methyl tert-butyl ether	86	70-130
1,1-Dichloroethane	88	70-130
cis-1,2-Dichloroethene	94	70-130
Chloroform	84	70-130
1,1,1-Trichloroethane	84	70-130
Carbon Tetrachloride	112	60-140
Benzene	81	70-130
1,2-Dichloroethane	84	70-130
Trichloroethene	79	70-130
Toluene	84	70-130
1,1,2-Trichloroethane	83	70-130
Tetrachloroethene	78	70-130
1,2-Dibromoethane (EDB)	86	70-130
Ethyl Benzene	85	70-130
m,p-Xylene	78	70-130
o-Xylene	83	70-130
1,1,2,2-Tetrachloroethane	80	70-130
1,4-Dichlorobenzene	69 Q	70-130

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	96	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1710210-13AA

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101204sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/12/17 09:11 AM**	

Compound	%Recovery	Method Limits
Freon 12	87	70-130
Freon 114	86	70-130
Chloromethane	86	70-130
Vinyl Chloride	84	70-130
Chloroethane	93	70-130
1,1-Dichloroethene	83	70-130
trans-1,2-Dichloroethene	72	70-130
Methyl tert-butyl ether	86	70-130
1,1-Dichloroethane	87	70-130
cis-1,2-Dichloroethene	94	70-130
Chloroform	84	70-130
1,1,1-Trichloroethane	83	70-130
Carbon Tetrachloride	111	60-140
Benzene	80	70-130
1,2-Dichloroethane	84	70-130
Trichloroethene	79	70-130
Toluene	82	70-130
1,1,2-Trichloroethane	82	70-130
Tetrachloroethene	79	70-130
1,2-Dibromoethane (EDB)	86	70-130
Ethyl Benzene	84	70-130
m,p-Xylene	77	70-130
o-Xylene	81	70-130
1,1,2,2-Tetrachloroethane	79	70-130
1,4-Dichlorobenzene	68 Q	70-130

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	97	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1710210-13B

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101605sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/16/17 10:24 AM**	

Compound	%Recovery	Method Limits
Freon 12	105	70-130
Freon 114	103	70-130
Chloromethane	105	70-130
Vinyl Chloride	102	70-130
Chloroethane	74	70-130
1,1-Dichloroethene	101	70-130
trans-1,2-Dichloroethene	87	70-130
Methyl tert-butyl ether	105	70-130
1,1-Dichloroethane	106	70-130
cis-1,2-Dichloroethene	113	70-130
Chloroform	100	70-130
1,1,1-Trichloroethane	100	70-130
Carbon Tetrachloride	134	60-140
Benzene	95	70-130
1,2-Dichloroethane	101	70-130
Trichloroethene	94	70-130
Toluene	99	70-130
1,1,2-Trichloroethane	98	70-130
Tetrachloroethene	94	70-130
1,2-Dibromoethane (EDB)	103	70-130
Ethyl Benzene	103	70-130
m,p-Xylene	96	70-130
o-Xylene	101	70-130
1,1,2,2-Tetrachloroethane	94	70-130
1,4-Dichlorobenzene	82	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1710210-13BB

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101606sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/16/17 11:19 AM**	

Compound	%Recovery	Method Limits
Freon 12	105	70-130
Freon 114	104	70-130
Chloromethane	105	70-130
Vinyl Chloride	103	70-130
Chloroethane	108	70-130
1,1-Dichloroethene	102	70-130
trans-1,2-Dichloroethene	88	70-130
Methyl tert-butyl ether	106	70-130
1,1-Dichloroethane	107	70-130
cis-1,2-Dichloroethene	114	70-130
Chloroform	101	70-130
1,1,1-Trichloroethane	101	70-130
Carbon Tetrachloride	136	60-140
Benzene	97	70-130
1,2-Dichloroethane	102	70-130
Trichloroethene	95	70-130
Toluene	100	70-130
1,1,2-Trichloroethane	100	70-130
Tetrachloroethene	96	70-130
1,2-Dibromoethane (EDB)	104	70-130
Ethyl Benzene	103	70-130
m,p-Xylene	94	70-130
o-Xylene	100	70-130
1,1,2,2-Tetrachloroethane	95	70-130
1,4-Dichlorobenzene	83	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	94	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1710210-13C

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101703sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/17/17 11:29 AM**	

Compound	%Recovery	Method Limits
Freon 12	109	70-130
Freon 114	105	70-130
Chloromethane	110	70-130
Vinyl Chloride	107	70-130
Chloroethane	119	70-130
1,1-Dichloroethene	104	70-130
trans-1,2-Dichloroethene	89	70-130
Methyl tert-butyl ether	108	70-130
1,1-Dichloroethane	108	70-130
cis-1,2-Dichloroethene	116	70-130
Chloroform	103	70-130
1,1,1-Trichloroethane	104	70-130
Carbon Tetrachloride	134	60-140
Benzene	98	70-130
1,2-Dichloroethane	103	70-130
Trichloroethene	98	70-130
Toluene	101	70-130
1,1,2-Trichloroethane	101	70-130
Tetrachloroethene	96	70-130
1,2-Dibromoethane (EDB)	105	70-130
Ethyl Benzene	103	70-130
m,p-Xylene	96	70-130
o-Xylene	100	70-130
1,1,2,2-Tetrachloroethane	94	70-130
1,4-Dichlorobenzene	83	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	94	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1710210-13CC

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101704sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/17/17 12:24 PM**	

Compound	%Recovery	Method Limits
Freon 12	107	70-130
Freon 114	105	70-130
Chloromethane	107	70-130
Vinyl Chloride	105	70-130
Chloroethane	119	70-130
1,1-Dichloroethene	103	70-130
trans-1,2-Dichloroethene	89	70-130
Methyl tert-butyl ether	108	70-130
1,1-Dichloroethane	108	70-130
cis-1,2-Dichloroethene	116	70-130
Chloroform	103	70-130
1,1,1-Trichloroethane	102	70-130
Carbon Tetrachloride	133	60-140
Benzene	97	70-130
1,2-Dichloroethane	103	70-130
Trichloroethene	97	70-130
Toluene	100	70-130
1,1,2-Trichloroethane	101	70-130
Tetrachloroethene	97	70-130
1,2-Dibromoethane (EDB)	106	70-130
Ethyl Benzene	103	70-130
m,p-Xylene	95	70-130
o-Xylene	101	70-130
1,1,2,2-Tetrachloroethane	94	70-130
1,4-Dichlorobenzene	84	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	95	70-130

eurofins | Air Toxics

10/17/2017
Mr. Ken Hannon
Missouri Dept. of Natural Resources
2710 West Main

Jefferson City MO 65109

Project Name: Dawson Metals
Project #:
Workorder #: 1710208A

Dear Mr. Ken Hannon

The following report includes the data for the above referenced project for sample(s) received on 10/11/2017 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 SIM are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Brian Whittaker at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Brian Whittaker

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1710208A

Work Order Summary

CLIENT:	Mr. Ken Hannon Missouri Dept. of Natural Resources 2710 West Main Jefferson City, MO 65109	**BILL TO:**	Accounts Payable Missouri Dept. of Natural Resources P.O Box 176 Jefferson City, MO 65102
PHONE:	573-526-3363	**P.O. #**	3ESP180259
FAX:	573-526-3350	**PROJECT #**	Dawson Metals
DATE RECEIVED:	10/11/2017	**CONTACT:**	Brian Whittaker
DATE COMPLETED:	10/17/2017		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	IA-10 #173792 Unisex Bathroom	Modified TO-15 SIM	8.5 "Hg	5 psi
02A	IA-11 #173793 Bread Room Shelf under TV	Modified TO-15 SIM	4.5 "Hg	5 psi
03A	IA-12 #173794 Front room filing cabinet	Modified TO-15 SIM	8.0 "Hg	5 psi
04A	AA-01 #173795 Back of Building	Modified TO-15 SIM	5.0 "Hg	5 psi
05A	AA-02 #173796 Front Building in Tree	Modified TO-15 SIM	9.5 "Hg	5 psi
06A	Lab Blank	Modified TO-15 SIM	NA	NA
07A	CCV	Modified TO-15 SIM	NA	NA
08A	LCS	Modified TO-15 SIM	NA	NA
08AA	LCSD	Modified TO-15 SIM	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 10/17/17

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

LABORATORY NARRATIVE
Modified TO-15 SIM
Missouri Dept. of Natural Resources
Workorder# 1710208A

Five 6 Liter Summa Canister (SIM Certified) samples were received on October 11, 2017. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the SIM acquisition mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	***TO-15***	***ATL Modifications***
ICAL %RSD acceptance criteria	</=30% RSD with 2 compounds allowed out to < 40% RSD	Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD
Daily Calibration	+- 30% Difference	Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers
Blank and standards	Zero air	Nitrogen
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page. Target compound non-detects in the samples that are associated with high bias in QC analyses have not been flagged.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See

data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

eurofins | Air Toxics

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: IA-10 #173792 Unisex Bathroom

Lab ID#: 1710208A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.037	0.41	0.18	2.0
Chloroform	0.037	0.039	0.18	0.19
Carbon Tetrachloride	0.037	0.069	0.24	0.43
Benzene	0.094	0.25	0.30	0.79
Trichloroethene	0.037	0.11	0.20	0.61
Toluene	0.037	1.3	0.14	5.0
Ethyl Benzene	0.037	0.21	0.16	0.92
m,p-Xylene	0.075	0.44	0.32	1.9
o-Xylene	0.037	0.20	0.16	0.88

Client Sample ID: IA-11 #173793 Bread Room Shelf under TV

Lab ID#: 1710208A-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.032	0.40	0.16	2.0
Chloroform	0.032	0.036	0.15	0.18
Carbon Tetrachloride	0.032	0.071	0.20	0.45
Benzene	0.079	0.28	0.25	0.88
Trichloroethene	0.032	0.11	0.17	0.57
Toluene	0.032	1.6	0.12	5.9
Ethyl Benzene	0.032	0.24	0.14	1.0
m,p-Xylene	0.063	0.48	0.27	2.1
o-Xylene	0.032	0.22	0.14	0.97

Client Sample ID: IA-12 #173794 Front room filing cabinet

Lab ID#: 1710208A-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.037	0.40	0.18	2.0
Carbon Tetrachloride	0.037	0.060	0.23	0.38
Benzene	0.092	0.55	0.29	1.8
Trichloroethene	0.037	0.099	0.20	0.53
Toluene	0.037	1.5	0.14	5.6

eurofins | Air Toxics

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS SIM

Client Sample ID: IA-12 #173794 Front room filing cabinet

Lab ID#: 1710208A-03A

Ethyl Benzene	0.037	0.23	0.16	0.98
m,p-Xylene	0.073	0.44	0.32	1.9
o-Xylene	0.037	0.20	0.16	0.88

Client Sample ID: AA-01 #173795 Back of Building

Lab ID#: 1710208A-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.032	0.40	0.16	2.0
Carbon Tetrachloride	0.032	0.073	0.20	0.46
Benzene	0.080	0.089	0.26	0.28
Toluene	0.032	0.29	0.12	1.1
Ethyl Benzene	0.032	0.072	0.14	0.31
m,p-Xylene	0.064	0.21	0.28	0.92
o-Xylene	0.032	0.091	0.14	0.39

Client Sample ID: AA-02 #173796 Front Building in Tree

Lab ID#: 1710208A-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.039	0.40	0.19	2.0
Carbon Tetrachloride	0.039	0.070	0.25	0.44
Toluene	0.039	0.084	0.15	0.32

eurofins | Air Toxics

Client Sample ID: IA-10 #173792 Unisex Bathroom

Lab ID#: 1710208A-01A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101209sim**	**Date of Collection: 10/2/17 3:54:00 PM**	
Dil. Factor:	**1.87**	**Date of Analysis: 10/12/17 03:30 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.037	0.41	0.18	2.0
Freon 114	0.037	Not Detected	0.26	Not Detected
Chloromethane	0.94	Not Detected	1.9	Not Detected
Vinyl Chloride	0.019	Not Detected	0.048	Not Detected
Chloroethane	0.094	Not Detected	0.25	Not Detected
1,1-Dichloroethene	0.019	Not Detected	0.074	Not Detected
trans-1,2-Dichloroethene	0.19	Not Detected	0.74	Not Detected
Methyl tert-butyl ether	0.19	Not Detected	0.67	Not Detected
1,1-Dichloroethane	0.037	Not Detected	0.15	Not Detected
cis-1,2-Dichloroethene	0.037	Not Detected	0.15	Not Detected
Chloroform	0.037	0.039	0.18	0.19
1,1,1-Trichloroethane	0.037	Not Detected	0.20	Not Detected
Carbon Tetrachloride	0.037	0.069	0.24	0.43
Benzene	0.094	0.25	0.30	0.79
1,2-Dichloroethane	0.037	Not Detected	0.15	Not Detected
Trichloroethene	0.037	0.11	0.20	0.61
Toluene	0.037	1.3	0.14	5.0
1,1,2-Trichloroethane	0.037	Not Detected	0.20	Not Detected
Tetrachloroethene	0.037	Not Detected	0.25	Not Detected
1,2-Dibromoethane (EDB)	0.037	Not Detected	0.29	Not Detected
Ethyl Benzene	0.037	0.21	0.16	0.92
m,p-Xylene	0.075	0.44	0.32	1.9
o-Xylene	0.037	0.20	0.16	0.88
1,1,2,2-Tetrachloroethane	0.037	Not Detected	0.26	Not Detected
1,4-Dichlorobenzene	0.037	Not Detected UJ	0.22	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	101	70-130

eurofins | Air Toxics

Client Sample ID: IA-11 #173793 Bread Room Shelf under TV

Lab ID#: 1710208A-02A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101210sim**	**Date of Collection:**	**10/2/17 3:55:00 PM**
Dil. Factor:	**1.58**	**Date of Analysis:**	**10/12/17 04:23 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.032	0.40	0.16	2.0
Freon 114	0.032	Not Detected	0.22	Not Detected
Chloromethane	0.79	Not Detected	1.6	Not Detected
Vinyl Chloride	0.016	Not Detected	0.040	Not Detected
Chloroethane	0.079	Not Detected	0.21	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.063	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.63	Not Detected
Methyl tert-butyl ether	0.16	Not Detected	0.57	Not Detected
1,1-Dichloroethane	0.032	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.12	Not Detected
Chloroform	0.032	0.036	0.15	0.18
1,1,1-Trichloroethane	0.032	Not Detected	0.17	Not Detected
Carbon Tetrachloride	0.032	0.071	0.20	0.45
Benzene	0.079	0.28	0.25	0.88
1,2-Dichloroethane	0.032	Not Detected	0.13	Not Detected
Trichloroethene	0.032	0.11	0.17	0.57
Toluene	0.032	1.6	0.12	5.9
1,1,2-Trichloroethane	0.032	Not Detected	0.17	Not Detected
Tetrachloroethene	0.032	Not Detected	0.21	Not Detected
1,2-Dibromoethane (EDB)	0.032	Not Detected	0.24	Not Detected
Ethyl Benzene	0.032	0.24	0.14	1.0
m,p-Xylene	0.063	0.48	0.27	2.1
o-Xylene	0.032	0.22	0.14	0.97
1,1,2,2-Tetrachloroethane	0.032	Not Detected	0.22	Not Detected
1,4-Dichlorobenzene	0.032	Not Detected UJ	0.19	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: IA-12 #173794 Front room filing cabinet

Lab ID#: 1710208A-03A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101211sim**	**Date of Collection: 10/2/17 3:56:00 PM**	
Dil. Factor:	**1.83**	**Date of Analysis: 10/12/17 04:59 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.037	0.40	0.18	2.0
Freon 114	0.037	Not Detected	0.26	Not Detected
Chloromethane	0.92	Not Detected	1.9	Not Detected
Vinyl Chloride	0.018	Not Detected	0.047	Not Detected
Chloroethane	0.092	Not Detected	0.24	Not Detected
1,1-Dichloroethene	0.018	Not Detected	0.072	Not Detected
trans-1,2-Dichloroethene	0.18	Not Detected	0.72	Not Detected
Methyl tert-butyl ether	0.18	Not Detected	0.66	Not Detected
1,1-Dichloroethane	0.037	Not Detected	0.15	Not Detected
cis-1,2-Dichloroethene	0.037	Not Detected	0.14	Not Detected
Chloroform	0.037	Not Detected	0.18	Not Detected
1,1,1-Trichloroethane	0.037	Not Detected	0.20	Not Detected
Carbon Tetrachloride	0.037	0.060	0.23	0.38
Benzene	0.092	0.55	0.29	1.8
1,2-Dichloroethane	0.037	Not Detected	0.15	Not Detected
Trichloroethene	0.037	0.099	0.20	0.53
Toluene	0.037	1.5	0.14	5.6
1,1,2-Trichloroethane	0.037	Not Detected	0.20	Not Detected
Tetrachloroethene	0.037	Not Detected	0.25	Not Detected
1,2-Dibromoethane (EDB)	0.037	Not Detected	0.28	Not Detected
Ethyl Benzene	0.037	0.23	0.16	0.98
m,p-Xylene	0.073	0.44	0.32	1.9
o-Xylene	0.037	0.20	0.16	0.88
1,1,2,2-Tetrachloroethane	0.037	Not Detected	0.25	Not Detected
1,4-Dichlorobenzene	0.037	Not Detected UJ	0.22	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	103	70-130

eurofins | Air Toxics

Client Sample ID: AA-01 #173795 Back of Building

Lab ID#: 1710208A-04A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101214sim**	**Date of Collection:**	**10/2/17 3:58:00 PM**
Dil. Factor:	**1.61**	**Date of Analysis:**	**10/12/17 06:50 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.032	0.40	0.16	2.0
Freon 114	0.032	Not Detected	0.22	Not Detected
Chloromethane	0.80	Not Detected	1.7	Not Detected
Vinyl Chloride	0.016	Not Detected	0.041	Not Detected
Chloroethane	0.080	Not Detected	0.21	Not Detected
1,1-Dichloroethene	0.016	Not Detected	0.064	Not Detected
trans-1,2-Dichloroethene	0.16	Not Detected	0.64	Not Detected
Methyl tert-butyl ether	0.16	Not Detected	0.58	Not Detected
1,1-Dichloroethane	0.032	Not Detected	0.13	Not Detected
cis-1,2-Dichloroethene	0.032	Not Detected	0.13	Not Detected
Chloroform	0.032	Not Detected	0.16	Not Detected
1,1,1-Trichloroethane	0.032	Not Detected	0.18	Not Detected
Carbon Tetrachloride	0.032	0.073	0.20	0.46
Benzene	0.080	0.089	0.26	0.28
1,2-Dichloroethane	0.032	Not Detected	0.13	Not Detected
Trichloroethene	0.032	Not Detected	0.17	Not Detected
Toluene	0.032	0.29	0.12	1.1
1,1,2-Trichloroethane	0.032	Not Detected	0.18	Not Detected
Tetrachloroethene	0.032	Not Detected	0.22	Not Detected
1,2-Dibromoethane (EDB)	0.032	Not Detected	0.25	Not Detected
Ethyl Benzene	0.032	0.072	0.14	0.31
m,p-Xylene	0.064	0.21	0.28	0.92
o-Xylene	0.032	0.091	0.14	0.39
1,1,2,2-Tetrachloroethane	0.032	Not Detected	0.22	Not Detected
1,4-Dichlorobenzene	0.032	Not Detected UJ	0.19	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: AA-02 #173796 Front Building in Tree

Lab ID#: 1710208A-05A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101213sim**	**Date of Collection: 10/2/17 4:18:00 PM**	
Dil. Factor:	**1.96**	**Date of Analysis: 10/12/17 06:10 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.039	0.40	0.19	2.0
Freon 114	0.039	Not Detected	0.27	Not Detected
Chloromethane	0.98	Not Detected	2.0	Not Detected
Vinyl Chloride	0.020	Not Detected	0.050	Not Detected
Chloroethane	0.098	Not Detected	0.26	Not Detected
1,1-Dichloroethene	0.020	Not Detected	0.078	Not Detected
trans-1,2-Dichloroethene	0.20	Not Detected	0.78	Not Detected
Methyl tert-butyl ether	0.20	Not Detected	0.71	Not Detected
1,1-Dichloroethane	0.039	Not Detected	0.16	Not Detected
cis-1,2-Dichloroethene	0.039	Not Detected	0.16	Not Detected
Chloroform	0.039	Not Detected	0.19	Not Detected
1,1,1-Trichloroethane	0.039	Not Detected	0.21	Not Detected
Carbon Tetrachloride	0.039	0.070	0.25	0.44
Benzene	0.098	Not Detected	0.31	Not Detected
1,2-Dichloroethane	0.039	Not Detected	0.16	Not Detected
Trichloroethene	0.039	Not Detected	0.21	Not Detected
Toluene	0.039	0.084	0.15	0.32
1,1,2-Trichloroethane	0.039	Not Detected	0.21	Not Detected
Tetrachloroethene	0.039	Not Detected	0.26	Not Detected
1,2-Dibromoethane (EDB)	0.039	Not Detected	0.30	Not Detected
Ethyl Benzene	0.039	Not Detected	0.17	Not Detected
m,p-Xylene	0.078	Not Detected	0.34	Not Detected
o-Xylene	0.039	Not Detected	0.17	Not Detected
1,1,2,2-Tetrachloroethane	0.039	Not Detected	0.27	Not Detected
1,4-Dichlorobenzene	0.039	Not Detected UJ	0.24	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: 6 Liter Summa Canister (SIM Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	103	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1710208A-06A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101206sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/12/17 10:56 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.020	Not Detected	0.099	Not Detected
Freon 114	0.020	Not Detected	0.14	Not Detected
Chloromethane	0.50	Not Detected	1.0	Not Detected
Vinyl Chloride	0.010	Not Detected	0.026	Not Detected
Chloroethane	0.050	Not Detected	0.13	Not Detected
1,1-Dichloroethene	0.010	Not Detected	0.040	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Methyl tert-butyl ether	0.10	Not Detected	0.36	Not Detected
1,1-Dichloroethane	0.020	Not Detected	0.081	Not Detected
cis-1,2-Dichloroethene	0.020	Not Detected	0.079	Not Detected
Chloroform	0.020	Not Detected	0.098	Not Detected
1,1,1-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Carbon Tetrachloride	0.020	Not Detected	0.12	Not Detected
Benzene	0.050	Not Detected	0.16	Not Detected
1,2-Dichloroethane	0.020	Not Detected	0.081	Not Detected
Trichloroethene	0.020	Not Detected	0.11	Not Detected
Toluene	0.020	Not Detected	0.075	Not Detected
1,1,2-Trichloroethane	0.020	Not Detected	0.11	Not Detected
Tetrachloroethene	0.020	Not Detected	0.14	Not Detected
1,2-Dibromoethane (EDB)	0.020	Not Detected	0.15	Not Detected
Ethyl Benzene	0.020	Not Detected	0.087	Not Detected
m,p-Xylene	0.040	Not Detected	0.17	Not Detected
o-Xylene	0.020	Not Detected	0.087	Not Detected
1,1,2,2-Tetrachloroethane	0.020	Not Detected	0.14	Not Detected
1,4-Dichlorobenzene	0.020	Not Detected UJ	0.12	Not Detected UJ

UJ = Analyte associated with low bias in the CCV.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	102	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1710208A-07A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101202sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/12/17 07:29 AM**	

Compound	%Recovery
Freon 12	85
Freon 114	81
Chloromethane	86
Vinyl Chloride	82
Chloroethane	92
1,1-Dichloroethene	82
trans-1,2-Dichloroethene	82
Methyl tert-butyl ether	86
1,1-Dichloroethane	87
cis-1,2-Dichloroethene	84
Chloroform	83
1,1,1-Trichloroethane	83
Carbon Tetrachloride	106
Benzene	80
1,2-Dichloroethane	84
Trichloroethene	78
Toluene	82
1,1,2-Trichloroethane	82
Tetrachloroethene	78
1,2-Dibromoethane (EDB)	86
Ethyl Benzene	84
m,p-Xylene	78
o-Xylene	81
1,1,2,2-Tetrachloroethane	77
1,4-Dichlorobenzene	67 Q

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	96	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1710208A-08A

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101203sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/12/17 08:22 AM**	

Compound	%Recovery	Method Limits
Freon 12	90	70-130
Freon 114	86	70-130
Chloromethane	88	70-130
Vinyl Chloride	86	70-130
Chloroethane	94	70-130
1,1-Dichloroethene	83	70-130
trans-1,2-Dichloroethene	72	70-130
Methyl tert-butyl ether	86	70-130
1,1-Dichloroethane	88	70-130
cis-1,2-Dichloroethene	94	70-130
Chloroform	84	70-130
1,1,1-Trichloroethane	84	70-130
Carbon Tetrachloride	112	60-140
Benzene	81	70-130
1,2-Dichloroethane	84	70-130
Trichloroethene	79	70-130
Toluene	84	70-130
1,1,2-Trichloroethane	83	70-130
Tetrachloroethene	78	70-130
1,2-Dibromoethane (EDB)	86	70-130
Ethyl Benzene	85	70-130
m,p-Xylene	78	70-130
o-Xylene	83	70-130
1,1,2,2-Tetrachloroethane	80	70-130
1,4-Dichlorobenzene	69 Q	70-130

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	96	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1710208A-08AA

MODIFIED EPA METHOD TO-15 GC/MS SIM

File Name:	**v101204sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/12/17 09:11 AM**	

Compound	%Recovery	Method Limits
Freon 12	87	70-130
Freon 114	86	70-130
Chloromethane	86	70-130
Vinyl Chloride	84	70-130
Chloroethane	93	70-130
1,1-Dichloroethene	83	70-130
trans-1,2-Dichloroethene	72	70-130
Methyl tert-butyl ether	86	70-130
1,1-Dichloroethane	87	70-130
cis-1,2-Dichloroethene	94	70-130
Chloroform	84	70-130
1,1,1-Trichloroethane	83	70-130
Carbon Tetrachloride	111	60-140
Benzene	80	70-130
1,2-Dichloroethane	84	70-130
Trichloroethene	79	70-130
Toluene	82	70-130
1,1,2-Trichloroethane	82	70-130
Tetrachloroethene	79	70-130
1,2-Dibromoethane (EDB)	86	70-130
Ethyl Benzene	84	70-130
m,p-Xylene	77	70-130
o-Xylene	81	70-130
1,1,2,2-Tetrachloroethane	79	70-130
1,4-Dichlorobenzene	68 Q	70-130

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	97	70-130

eurofins | Air Toxics

10/17/2017
Mr. Ken Hannon
Missouri Dept. of Natural Resources
2710 West Main

Jefferson City MO 65109

Project Name: Dawson Metals
Project #:
Workorder #: 1710208B

Dear Mr. Ken Hannon

The following report includes the data for the above referenced project for sample(s) received on 10/11/2017 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Brian Whittaker at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Brian Whittaker

Project Manager

eurofins | Air Toxics

WORK ORDER #: 1710208B

Work Order Summary

CLIENT:	Mr. Ken Hannon Missouri Dept. of Natural Resources 2710 West Main Jefferson City, MO 65109	**BILL TO:**	Accounts Payable Missouri Dept. of Natural Resources P.O Box 176 Jefferson City, MO 65102
PHONE:	573-526-3363	**P.O. #**	3ESP180259
FAX:	573-526-3350	**PROJECT #**	Dawson Metals
DATE RECEIVED:	10/11/2017	**CONTACT:**	Brian Whittaker
DATE COMPLETED:	10/17/2017		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
06A	SS-11 #173842 - Breakroom	TO-15	5.1 "Hg	15 psi
07A	SS-12 #173843 - Copy room/office	TO-15	3.3 "Hg	15 psi
08A	SS-01 #173844 - Room 1	TO-15	4.1 "Hg	15.2 psi
09A	SS-13 #173845 - Room 1	TO-15	2.8 "Hg	15.2 psi
10A	SS-02 #173846 - Room 1	TO-15	2.8 "Hg	14.7 psi
11A	SS-03 #173847, Room 1 co-located	TO-15	2.8 "Hg	15.3 psi
12A	SS-14 #173848, Room 1	TO-15	2.6 "Hg	15 psi
13A	SS-04 #173849, Room 2	TO-15	3.1 "Hg	14.9 psi
14A	SS-05 #173850 Room 3	TO-15	2.6 "Hg	15 psi
15A	SS-06 #173851 Room 5	TO-15	1.6 "Hg	15.4 psi
16A	SS-07 #173852 Room 6	TO-15	3.9 "Hg	14.5 psi
17A	SS-08 #173853 Room 7	TO-15	3.9 "Hg	14.6 psi
18A	SS-09 #173854 Room 9	TO-15	3.9 "Hg	14.9 psi
19A	SS-10 #173855 Room 8	TO-15	1.8 "Hg	14.7 psi
20A	Lab Blank	TO-15	NA	NA
21A	CCV	TO-15	NA	NA
22A	LCS	TO-15	NA	NA
22AA	LCSD	TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 10/17/17

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

LABORATORY NARRATIVE
EPA Method TO-15
Missouri Dept. of Natural Resources
Workorder# 1710208B

Fourteen 1 Liter Summa Canister samples were received on October 11, 2017. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

The Chain of Custody (COC) information for samples SS-09 #173854 Room 9 and SS-10 #173855 Room 8 did not match the information on the canisters with regard to canister identification. The client was notified of the discrepancy and the information on the canister was used to process and report the samples.

Analytical Notes

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page. Target compound non-detects in the samples that are associated with high bias in QC analyses have not been flagged.

Dilution was performed on samples SS-13 #173845 - Room 1, SS-02 #173846 - Room 1 and SS-03 #173847, Room 1 co-located due to the presence of high level target species.

Definition of Data Qualifying Flags

Ten qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

M - Reported value may be biased due to apparent matrix interferences.

CN - See Case Narrative.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

eurofins | Air Toxics

Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SS-11 #173842 - Breakroom

Lab ID#: 1710208B-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.9	31	9.2	58
Acetone	12	29	29	69
2-Propanol	4.9	5.8	12	14
Tetrahydrofuran	1.2	11	3.6	32
Toluene	1.2	5.9	4.6	22
Ethyl Benzene	1.2	2.0	5.3	8.9
m,p-Xylene	1.2	5.9	5.3	26
o-Xylene	1.2	2.6	5.3	11
Styrene	1.2	2.0	5.2	8.7
4-Ethyltoluene	1.2	2.2	6.0	11
1,2,4-Trimethylbenzene	1.2	2.5	6.0	12

Client Sample ID: SS-12 #173843 - Copy room/office

Lab ID#: 1710208B-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.5	55	8.6	100
Acetone	11	25	27	60
2-Propanol	4.5	5.3	11	13
Tetrahydrofuran	1.1	9.1	3.3	27
Toluene	1.1	4.6	4.3	17
Ethyl Benzene	1.1	1.7	4.9	7.3
m,p-Xylene	1.1	5.3	4.9	23
o-Xylene	1.1	2.3	4.9	10
Styrene	1.1	1.8	4.8	7.6
4-Ethyltoluene	1.1	2.2	5.6	11
1,2,4-Trimethylbenzene	1.1	2.4	5.6	12

Client Sample ID: SS-01 #173844 - Room 1

Lab ID#: 1710208B-08A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.7	42	8.9	80

eurofins | Air Toxics

Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SS-01 #173844 - Room 1

Lab ID#: 1710208B-08A

Acetone	12	29	28	70
Tetrahydrofuran	1.2	16	3.5	47
4-Methyl-2-pentanone	1.2	1.8	4.8	7.2
Toluene	1.2	8.1	4.4	30
Ethyl Benzene	1.2	2.8	5.1	12
m,p-Xylene	1.2	8.0	5.1	34
o-Xylene	1.2	3.3	5.1	14
Styrene	1.2	2.9	5.0	12
4-Ethyltoluene	1.2	2.7	5.8	13
1,2,4-Trimethylbenzene	1.2	3.1	5.8	15

Client Sample ID: SS-13 #173845 - Room 1

Lab ID#: 1710208B-09A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
cis-1,2-Dichloroethene	11	11	44	45
Tetrahydrofuran	11	12	33	36
Trichloroethene	11	2400	60	13000
Tetrachloroethene	11	11	76	77

Client Sample ID: SS-02 #173846 - Room 1

Lab ID#: 1710208B-10A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Tetrahydrofuran	8.8	14	26	41
Trichloroethene	8.8	2000	47	11000

Client Sample ID: SS-03 #173847, Room 1 co-located

Lab ID#: 1710208B-11A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Tetrahydrofuran	11	14	33	40
Trichloroethene	11	3700	60	20000

eurofins | Air Toxics

Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SS-14 #173848, Room 1

Lab ID#: 1710208B-12A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.4	45	8.3	85
Acetone	11	33	26	80
2-Butanone (Methyl Ethyl Ketone)	4.4	4.6	13	13
Tetrahydrofuran	1.1	14	3.2	42
Trichloroethene	1.1	200	5.9	1000
4-Methyl-2-pentanone	1.1	1.6	4.5	6.6
Toluene	1.1	5.9	4.2	22
Ethyl Benzene	1.1	2.4	4.8	10
m,p-Xylene	1.1	7.1	4.8	31
o-Xylene	1.1	3.3	4.8	14
Styrene	1.1	2.6	4.7	11
4-Ethyltoluene	1.1	2.8	5.4	14
1,2,4-Trimethylbenzene	1.1	3.2	5.4	16

Client Sample ID: SS-04 #173849, Room 2

Lab ID#: 1710208B-13A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.5	28	8.4	54
Acetone	11	30	27	71
Tetrahydrofuran	1.1	13	3.3	38
Trichloroethene	1.1	1.6	6.0	8.5
4-Methyl-2-pentanone	1.1	1.2	4.6	4.8
Toluene	1.1	4.5	4.2	17
Ethyl Benzene	1.1	1.8	4.9	8.0
m,p-Xylene	1.1	5.6	4.9	24
o-Xylene	1.1	2.5	4.9	11
Styrene	1.1	2.1	4.8	9.0
4-Ethyltoluene	1.1	2.3	5.5	12
1,2,4-Trimethylbenzene	1.1	2.8	5.5	14

eurofins | Air Toxics

Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SS-05 #173850 Room 3

Lab ID#: 1710208B-14A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.4	55	8.3	100
Acetone	11	40	26	96
Hexane	1.1	2.2	3.9	7.8
2-Butanone (Methyl Ethyl Ketone)	4.4	4.4	13	13
Tetrahydrofuran	1.1	17	3.2	52
Heptane	1.1	12	4.5	49
4-Methyl-2-pentanone	1.1	1.6	4.5	6.8
Toluene	1.1	6.7	4.2	25
Ethyl Benzene	1.1	2.4	4.8	10
m,p-Xylene	1.1	7.3	4.8	32
o-Xylene	1.1	3.4	4.8	15
Styrene	1.1	2.5	4.7	11
4-Ethyltoluene	1.1	2.7	5.4	13
1,2,4-Trimethylbenzene	1.1	3.1	5.4	15

Client Sample ID: SS-06 #173851 Room 5

Lab ID#: 1710208B-15A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.3	76	8.1	140
Acetone	11	62	26	150
2-Propanol	4.3	6.0	11	15
Hexane	1.1	1.1	3.8	4.0
2-Butanone (Methyl Ethyl Ketone)	4.3	7.9	13	23
Tetrahydrofuran	1.1	18	3.2	53
1,1,1-Trichloroethane	1.1	11	5.9	60
4-Methyl-2-pentanone	1.1	1.6	4.4	6.6
Toluene	1.1	6.5	4.1	24
Ethyl Benzene	1.1	2.4	4.7	10
m,p-Xylene	1.1	6.9	4.7	30
o-Xylene	1.1	3.2	4.7	14
Styrene	1.1	2.4	4.6	10
4-Ethyltoluene	1.1	2.6	5.3	13

eurofins | Air Toxics

Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SS-06 #173851 Room 5

Lab ID#: 1710208B-15A

1,2,4-Trimethylbenzene	1.1	3.1	5.3	15

Client Sample ID: SS-07 #173852 Room 6

Lab ID#: 1710208B-16A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.6	56	8.6	110
Acetone	11	41	27	97
2-Propanol	4.6	5.3	11	13
2-Butanone (Methyl Ethyl Ketone)	4.6	5.8	13	17
Tetrahydrofuran	1.1	19	3.4	55
4-Methyl-2-pentanone	1.1	1.5	4.7	6.2
Toluene	1.1	10	4.3	38
Ethyl Benzene	1.1	3.0	4.9	13
m,p-Xylene	1.1	8.1	5.0	35
o-Xylene	1.1	3.9	5.0	17
Styrene	1.1	2.5	4.8	11
4-Ethyltoluene	1.1	2.9	5.6	14
1,2,4-Trimethylbenzene	1.1	3.5	5.6	17

Client Sample ID: SS-08 #173853 Room 7

Lab ID#: 1710208B-17A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.6	52	8.6	98
Acetone	11	31	27	74
2-Propanol	4.6	6.4	11	16
2-Butanone (Methyl Ethyl Ketone)	4.6	6.2	14	18
Tetrahydrofuran	1.1	2.4	3.4	7.1
Cyclohexane	1.1	1.2	3.9	4.2
2,2,4-Trimethylpentane	1.1	1.3	5.3	6.2
Benzene	1.1	1.3	3.6	4.2
Heptane	1.1	1.3	4.7	5.3
Toluene	1.1	11	4.3	40

eurofins | Air Toxics

Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SS-08 #173853 Room 7

Lab ID#: 1710208B-17A

Ethyl Benzene	1.1	2.4	5.0	10
m,p-Xylene	1.1	8.9	5.0	38
o-Xylene	1.1	3.5	5.0	15
4-Ethyltoluene	1.1	4.2	5.6	20
1,2,4-Trimethylbenzene	1.1	4.4	5.6	22

Client Sample ID: SS-09 #173854 Room 9

Lab ID#: 1710208B-18A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.6	59	8.7	110
Acetone	12	48	27	110
2-Propanol	4.6	9.0	11	22
2-Butanone (Methyl Ethyl Ketone)	4.6	5.2	14	15
Tetrahydrofuran	1.2	18	3.4	52
4-Methyl-2-pentanone	1.2	1.5	4.7	6.3
Toluene	1.2	5.3	4.4	20
Ethyl Benzene	1.2	2.3	5.0	10
m,p-Xylene	1.2	6.6	5.0	29
o-Xylene	1.2	3.2	5.0	14
Styrene	1.2	2.3	4.9	9.9
4-Ethyltoluene	1.2	3.1	5.7	15
1,2,4-Trimethylbenzene	1.2	3.5	5.7	17

Client Sample ID: SS-10 #173855 Room 8

Lab ID#: 1710208B-19A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Ethanol	4.3	72	8.0	130
Acetone	11	77	25	180
2-Propanol	4.3	6.5	10	16
2-Butanone (Methyl Ethyl Ketone)	4.3	10	12	31
Tetrahydrofuran	1.1	2.6	3.1	7.7
Toluene	1.1	8.8	4.0	33

eurofins | Air Toxics

Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SS-10 #173855 Room 8

Lab ID#: 1710208B-19A

Ethyl Benzene	1.1	2.4	4.6	10
m,p-Xylene	1.1	9.0	4.6	39
o-Xylene	1.1	3.3	4.6	14
4-Ethyltoluene	1.1	5.0	5.2	24
1,3,5-Trimethylbenzene	1.1	1.2	5.2	6.0
1,2,4-Trimethylbenzene	1.1	5.2	5.2	25

eurofins | Air Toxics

Client Sample ID: SS-11 #173842 - Breakroom

Lab ID#: 1710208B-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101310**	**Date of Collection:**	**10/4/17 9:12:00 AM**
Dil. Factor:	**2.43**	**Date of Analysis:**	**10/13/17 05:35 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.2	Not Detected	6.0	Not Detected
Freon 114	1.2	Not Detected	8.5	Not Detected
Chloromethane	12	Not Detected	25	Not Detected
Vinyl Chloride	1.2	Not Detected	3.1	Not Detected
1,3-Butadiene	1.2	Not Detected	2.7	Not Detected
Bromomethane	12	Not Detected	47	Not Detected
Chloroethane	4.9	Not Detected	13	Not Detected
Freon 11	1.2	Not Detected	6.8	Not Detected
Ethanol	4.9	31	9.2	58
Freon 113	1.2	Not Detected	9.3	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Acetone	12	29	29	69
2-Propanol	4.9	5.8	12	14
Carbon Disulfide	4.9	Not Detected	15	Not Detected
3-Chloropropene	4.9	Not Detected	15	Not Detected
Methylene Chloride	12	Not Detected	42	Not Detected
Methyl tert-butyl ether	4.9	Not Detected	18	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Hexane	1.2	Not Detected	4.3	Not Detected
1,1-Dichloroethane	1.2	Not Detected	4.9	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.9	Not Detected	14	Not Detected
cis-1,2-Dichloroethene	1.2	Not Detected	4.8	Not Detected
Tetrahydrofuran	1.2	11	3.6	32
Chloroform	1.2	Not Detected	5.9	Not Detected
1,1,1-Trichloroethane	1.2	Not Detected	6.6	Not Detected
Cyclohexane	1.2	Not Detected	4.2	Not Detected
Carbon Tetrachloride	1.2	Not Detected	7.6	Not Detected
2,2,4-Trimethylpentane	1.2	Not Detected	5.7	Not Detected
Benzene	1.2	Not Detected	3.9	Not Detected
1,2-Dichloroethane	1.2	Not Detected	4.9	Not Detected
Heptane	1.2	Not Detected	5.0	Not Detected
Trichloroethene	1.2	Not Detected	6.5	Not Detected
1,2-Dichloropropane	1.2	Not Detected	5.6	Not Detected
1,4-Dioxane	4.9	Not Detected	18	Not Detected
Bromodichloromethane	1.2	Not Detected	8.1	Not Detected
cis-1,3-Dichloropropene	1.2	Not Detected	5.5	Not Detected
4-Methyl-2-pentanone	1.2	Not Detected	5.0	Not Detected
Toluene	1.2	5.9	4.6	22
trans-1,3-Dichloropropene	1.2	Not Detected	5.5	Not Detected
1,1,2-Trichloroethane	1.2	Not Detected	6.6	Not Detected
Tetrachloroethene	1.2	Not Detected	8.2	Not Detected
2-Hexanone	4.9	Not Detected	20	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-11 #173842 - Breakroom

Lab ID#: 1710208B-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101310**	**Date of Collection:**	**10/4/17 9:12:00 AM**
Dil. Factor:	**2.43**	**Date of Analysis:**	**10/13/17 05:35 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.2	Not Detected	10	Not Detected
1,2-Dibromoethane (EDB)	1.2	Not Detected	9.3	Not Detected
Chlorobenzene	1.2	Not Detected	5.6	Not Detected
Ethyl Benzene	1.2	2.0	5.3	8.9
m,p-Xylene	1.2	5.9	5.3	26
o-Xylene	1.2	2.6	5.3	11
Styrene	1.2	2.0	5.2	8.7
Bromoform	1.2	Not Detected	12	Not Detected
Cumene	1.2	Not Detected	6.0	Not Detected
1,1,2,2-Tetrachloroethane	1.2	Not Detected	8.3	Not Detected
Propylbenzene	1.2	Not Detected	6.0	Not Detected
4-Ethyltoluene	1.2	2.2	6.0	11
1,3,5-Trimethylbenzene	1.2	Not Detected	6.0	Not Detected
1,2,4-Trimethylbenzene	1.2	2.5	6.0	12
1,3-Dichlorobenzene	1.2	Not Detected	7.3	Not Detected
1,4-Dichlorobenzene	1.2	Not Detected	7.3	Not Detected
alpha-Chlorotoluene	1.2	Not Detected	6.3	Not Detected
1,2-Dichlorobenzene	1.2	Not Detected	7.3	Not Detected
1,2,4-Trichlorobenzene	4.9	Not Detected	36	Not Detected
Hexachlorobutadiene	4.9	Not Detected	52	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	106	70-130
1,2-Dichloroethane-d4	113	70-130
4-Bromofluorobenzene	91	70-130

eurofins | Air Toxics

Client Sample ID: SS-12 #173843 - Copy room/office

Lab ID#: 1710208B-07A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101311**	**Date of Collection:**	**10/4/17 9:13:00 AM**
Dil. Factor:	**2.27**	**Date of Analysis:**	**10/13/17 06:05 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.6	Not Detected
Freon 114	1.1	Not Detected	7.9	Not Detected
Chloromethane	11	Not Detected	23	Not Detected
Vinyl Chloride	1.1	Not Detected	2.9	Not Detected
1,3-Butadiene	1.1	Not Detected	2.5	Not Detected
Bromomethane	11	Not Detected	44	Not Detected
Chloroethane	4.5	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.4	Not Detected
Ethanol	4.5	55	8.6	100
Freon 113	1.1	Not Detected	8.7	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Acetone	11	25	27	60
2-Propanol	4.5	5.3	11	13
Carbon Disulfide	4.5	Not Detected	14	Not Detected
3-Chloropropene	4.5	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	39	Not Detected
Methyl tert-butyl ether	4.5	Not Detected	16	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Hexane	1.1	Not Detected	4.0	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.6	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.5	Not Detected	13	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Tetrahydrofuran	1.1	9.1	3.3	27
Chloroform	1.1	Not Detected	5.5	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Cyclohexane	1.1	Not Detected	3.9	Not Detected
Carbon Tetrachloride	1.1	Not Detected	7.1	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.3	Not Detected
Benzene	1.1	Not Detected	3.6	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.6	Not Detected
Heptane	1.1	Not Detected	4.6	Not Detected
Trichloroethene	1.1	Not Detected	6.1	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.2	Not Detected
1,4-Dioxane	4.5	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.6	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.2	Not Detected
4-Methyl-2-pentanone	1.1	Not Detected	4.6	Not Detected
Toluene	1.1	4.6	4.3	17
trans-1,3-Dichloropropene	1.1	Not Detected	5.2	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Tetrachloroethene	1.1	Not Detected	7.7	Not Detected
2-Hexanone	4.5	Not Detected	18	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-12 #173843 - Copy room/office

Lab ID#: 1710208B-07A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101311**	**Date of Collection:**	**10/4/17 9:13:00 AM**
Dil. Factor:	**2.27**	**Date of Analysis:**	**10/13/17 06:05 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.7	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.7	Not Detected
Chlorobenzene	1.1	Not Detected	5.2	Not Detected
Ethyl Benzene	1.1	1.7	4.9	7.3
m,p-Xylene	1.1	5.3	4.9	23
o-Xylene	1.1	2.3	4.9	10
Styrene	1.1	1.8	4.8	7.6
Bromoform	1.1	Not Detected	12	Not Detected
Cumene	1.1	Not Detected	5.6	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.8	Not Detected
Propylbenzene	1.1	Not Detected	5.6	Not Detected
4-Ethyltoluene	1.1	2.2	5.6	11
1,3,5-Trimethylbenzene	1.1	Not Detected	5.6	Not Detected
1,2,4-Trimethylbenzene	1.1	2.4	5.6	12
1,3-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.9	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
1,2,4-Trichlorobenzene	4.5	Not Detected	34	Not Detected
Hexachlorobutadiene	4.5	Not Detected	48	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	106	70-130
1,2-Dichloroethane-d4	118	70-130
4-Bromofluorobenzene	89	70-130

eurofins | Air Toxics

Client Sample ID: SS-01 #173844 - Room 1

Lab ID#: 1710208B-08A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101312**	**Date of Collection:**	**10/4/17 9:34:00 AM**
Dil. Factor:	**2.36**	**Date of Analysis:**	**10/13/17 06:34 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.2	Not Detected	5.8	Not Detected
Freon 114	1.2	Not Detected	8.2	Not Detected
Chloromethane	12	Not Detected	24	Not Detected
Vinyl Chloride	1.2	Not Detected	3.0	Not Detected
1,3-Butadiene	1.2	Not Detected	2.6	Not Detected
Bromomethane	12	Not Detected	46	Not Detected
Chloroethane	4.7	Not Detected	12	Not Detected
Freon 11	1.2	Not Detected	6.6	Not Detected
Ethanol	4.7	42	8.9	80
Freon 113	1.2	Not Detected	9.0	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.7	Not Detected
Acetone	12	29	28	70
2-Propanol	4.7	Not Detected	12	Not Detected
Carbon Disulfide	4.7	Not Detected	15	Not Detected
3-Chloropropene	4.7	Not Detected	15	Not Detected
Methylene Chloride	12	Not Detected	41	Not Detected
Methyl tert-butyl ether	4.7	Not Detected	17	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.7	Not Detected
Hexane	1.2	Not Detected	4.2	Not Detected
1,1-Dichloroethane	1.2	Not Detected	4.8	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.7	Not Detected	14	Not Detected
cis-1,2-Dichloroethene	1.2	Not Detected	4.7	Not Detected
Tetrahydrofuran	1.2	16	3.5	47
Chloroform	1.2	Not Detected	5.8	Not Detected
1,1,1-Trichloroethane	1.2	Not Detected	6.4	Not Detected
Cyclohexane	1.2	Not Detected	4.1	Not Detected
Carbon Tetrachloride	1.2	Not Detected	7.4	Not Detected
2,2,4-Trimethylpentane	1.2	Not Detected	5.5	Not Detected
Benzene	1.2	Not Detected	3.8	Not Detected
1,2-Dichloroethane	1.2	Not Detected	4.8	Not Detected
Heptane	1.2	Not Detected	4.8	Not Detected
Trichloroethene	1.2	Not Detected	6.3	Not Detected
1,2-Dichloropropane	1.2	Not Detected	5.4	Not Detected
1,4-Dioxane	4.7	Not Detected	17	Not Detected
Bromodichloromethane	1.2	Not Detected	7.9	Not Detected
cis-1,3-Dichloropropene	1.2	Not Detected	5.4	Not Detected
4-Methyl-2-pentanone	1.2	1.8	4.8	7.2
Toluene	1.2	8.1	4.4	30
trans-1,3-Dichloropropene	1.2	Not Detected	5.4	Not Detected
1,1,2-Trichloroethane	1.2	Not Detected	6.4	Not Detected
Tetrachloroethene	1.2	Not Detected	8.0	Not Detected
2-Hexanone	4.7	Not Detected	19	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-01 #173844 - Room 1

Lab ID#: 1710208B-08A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101312**	**Date of Collection:**	**10/4/17 9:34:00 AM**
Dil. Factor:	**2.36**	**Date of Analysis:**	**10/13/17 06:34 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.2	Not Detected	10	Not Detected
1,2-Dibromoethane (EDB)	1.2	Not Detected	9.1	Not Detected
Chlorobenzene	1.2	Not Detected	5.4	Not Detected
Ethyl Benzene	1.2	2.8	5.1	12
m,p-Xylene	1.2	8.0	5.1	34
o-Xylene	1.2	3.3	5.1	14
Styrene	1.2	2.9	5.0	12
Bromoform	1.2	Not Detected	12	Not Detected
Cumene	1.2	Not Detected	5.8	Not Detected
1,1,2,2-Tetrachloroethane	1.2	Not Detected	8.1	Not Detected
Propylbenzene	1.2	Not Detected	5.8	Not Detected
4-Ethyltoluene	1.2	2.7	5.8	13
1,3,5-Trimethylbenzene	1.2	Not Detected	5.8	Not Detected
1,2,4-Trimethylbenzene	1.2	3.1	5.8	15
1,3-Dichlorobenzene	1.2	Not Detected	7.1	Not Detected
1,4-Dichlorobenzene	1.2	Not Detected	7.1	Not Detected
alpha-Chlorotoluene	1.2	Not Detected	6.1	Not Detected
1,2-Dichlorobenzene	1.2	Not Detected	7.1	Not Detected
1,2,4-Trichlorobenzene	4.7	Not Detected	35	Not Detected
Hexachlorobutadiene	4.7	Not Detected	50	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	107	70-130
1,2-Dichloroethane-d4	113	70-130
4-Bromofluorobenzene	89	70-130

eurofins | Air Toxics

Client Sample ID: SS-13 #173845 - Room 1

Lab ID#: 1710208B-09A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101325**	**Date of Collection:**	**10/4/17 9:34:00 AM**
Dil. Factor:	**22.4**	**Date of Analysis:**	**10/14/17 02:39 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	11	Not Detected	55	Not Detected
Freon 114	11	Not Detected	78	Not Detected
Chloromethane	110	Not Detected	230	Not Detected
Vinyl Chloride	11	Not Detected	29	Not Detected
1,3-Butadiene	11	Not Detected	25	Not Detected
Bromomethane	110	Not Detected	430	Not Detected
Chloroethane	45	Not Detected	120	Not Detected
Freon 11	11	Not Detected	63	Not Detected
Ethanol	45	Not Detected	84	Not Detected
Freon 113	11	Not Detected	86	Not Detected
1,1-Dichloroethene	11	Not Detected	44	Not Detected
Acetone	110	Not Detected	270	Not Detected
2-Propanol	45	Not Detected	110	Not Detected
Carbon Disulfide	45	Not Detected	140	Not Detected
3-Chloropropene	45	Not Detected	140	Not Detected
Methylene Chloride	110	Not Detected	390	Not Detected
Methyl tert-butyl ether	45	Not Detected	160	Not Detected
trans-1,2-Dichloroethene	11	Not Detected	44	Not Detected
Hexane	11	Not Detected	39	Not Detected
1,1-Dichloroethane	11	Not Detected	45	Not Detected
2-Butanone (Methyl Ethyl Ketone)	45	Not Detected	130	Not Detected
cis-1,2-Dichloroethene	11	11	44	45
Tetrahydrofuran	11	12	33	36
Chloroform	11	Not Detected	55	Not Detected
1,1,1-Trichloroethane	11	Not Detected	61	Not Detected
Cyclohexane	11	Not Detected	38	Not Detected
Carbon Tetrachloride	11	Not Detected	70	Not Detected
2,2,4-Trimethylpentane	11	Not Detected	52	Not Detected
Benzene	11	Not Detected	36	Not Detected
1,2-Dichloroethane	11	Not Detected	45	Not Detected
Heptane	11	Not Detected	46	Not Detected
Trichloroethene	11	2400	60	13000
1,2-Dichloropropane	11	Not Detected	52	Not Detected
1,4-Dioxane	45	Not Detected	160	Not Detected
Bromodichloromethane	11	Not Detected	75	Not Detected
cis-1,3-Dichloropropene	11	Not Detected	51	Not Detected
4-Methyl-2-pentanone	11	Not Detected	46	Not Detected
Toluene	11	Not Detected	42	Not Detected
trans-1,3-Dichloropropene	11	Not Detected	51	Not Detected
1,1,2-Trichloroethane	11	Not Detected	61	Not Detected
Tetrachloroethene	11	11	76	77
2-Hexanone	45	Not Detected	180	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-13 #173845 - Room 1

Lab ID#: 1710208B-09A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101325**	**Date of Collection:**	**10/4/17 9:34:00 AM**
Dil. Factor:	**22.4**	**Date of Analysis:**	**10/14/17 02:39 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	11	Not Detected	95	Not Detected
1,2-Dibromoethane (EDB)	11	Not Detected	86	Not Detected
Chlorobenzene	11	Not Detected	52	Not Detected
Ethyl Benzene	11	Not Detected	49	Not Detected
m,p-Xylene	11	Not Detected	49	Not Detected
o-Xylene	11	Not Detected	49	Not Detected
Styrene	11	Not Detected	48	Not Detected
Bromoform	11	Not Detected	120	Not Detected
Cumene	11	Not Detected	55	Not Detected
1,1,2,2-Tetrachloroethane	11	Not Detected	77	Not Detected
Propylbenzene	11	Not Detected	55	Not Detected
4-Ethyltoluene	11	Not Detected	55	Not Detected
1,3,5-Trimethylbenzene	11	Not Detected	55	Not Detected
1,2,4-Trimethylbenzene	11	Not Detected	55	Not Detected
1,3-Dichlorobenzene	11	Not Detected	67	Not Detected
1,4-Dichlorobenzene	11	Not Detected	67	Not Detected
alpha-Chlorotoluene	11	Not Detected	58	Not Detected
1,2-Dichlorobenzene	11	Not Detected	67	Not Detected
1,2,4-Trichlorobenzene	45	Not Detected	330	Not Detected
Hexachlorobutadiene	45	Not Detected	480	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	107	70-130
1,2-Dichloroethane-d4	118	70-130
4-Bromofluorobenzene	96	70-130

eurofins | Air Toxics

Client Sample ID: SS-02 #173846 - Room 1

Lab ID#: 1710208B-10A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101318**	**Date of Collection:**	**10/4/17 9:57:00 AM**
Dil. Factor:	**17.6**	**Date of Analysis:**	**10/13/17 11:26 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	8.8	Not Detected	44	Not Detected
Freon 114	8.8	Not Detected	62	Not Detected
Chloromethane	88	Not Detected	180	Not Detected
Vinyl Chloride	8.8	Not Detected	22	Not Detected
1,3-Butadiene	8.8	Not Detected	19	Not Detected
Bromomethane	88	Not Detected	340	Not Detected
Chloroethane	35	Not Detected	93	Not Detected
Freon 11	8.8	Not Detected	49	Not Detected
Ethanol	35	Not Detected	66	Not Detected
Freon 113	8.8	Not Detected	67	Not Detected
1,1-Dichloroethene	8.8	Not Detected	35	Not Detected
Acetone	88	Not Detected	210	Not Detected
2-Propanol	35	Not Detected	86	Not Detected
Carbon Disulfide	35	Not Detected	110	Not Detected
3-Chloropropene	35	Not Detected	110	Not Detected
Methylene Chloride	88	Not Detected	300	Not Detected
Methyl tert-butyl ether	35	Not Detected	130	Not Detected
trans-1,2-Dichloroethene	8.8	Not Detected	35	Not Detected
Hexane	8.8	Not Detected	31	Not Detected
1,1-Dichloroethane	8.8	Not Detected	36	Not Detected
2-Butanone (Methyl Ethyl Ketone)	35	Not Detected	100	Not Detected
cis-1,2-Dichloroethene	8.8	Not Detected	35	Not Detected
Tetrahydrofuran	8.8	14	26	41
Chloroform	8.8	Not Detected	43	Not Detected
1,1,1-Trichloroethane	8.8	Not Detected	48	Not Detected
Cyclohexane	8.8	Not Detected	30	Not Detected
Carbon Tetrachloride	8.8	Not Detected	55	Not Detected
2,2,4-Trimethylpentane	8.8	Not Detected	41	Not Detected
Benzene	8.8	Not Detected	28	Not Detected
1,2-Dichloroethane	8.8	Not Detected	36	Not Detected
Heptane	8.8	Not Detected	36	Not Detected
Trichloroethene	8.8	2000	47	11000
1,2-Dichloropropane	8.8	Not Detected	41	Not Detected
1,4-Dioxane	35	Not Detected	130	Not Detected
Bromodichloromethane	8.8	Not Detected	59	Not Detected
cis-1,3-Dichloropropene	8.8	Not Detected	40	Not Detected
4-Methyl-2-pentanone	8.8	Not Detected	36	Not Detected
Toluene	8.8	Not Detected	33	Not Detected
trans-1,3-Dichloropropene	8.8	Not Detected	40	Not Detected
1,1,2-Trichloroethane	8.8	Not Detected	48	Not Detected
Tetrachloroethene	8.8	Not Detected	60	Not Detected
2-Hexanone	35	Not Detected	140	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-02 #173846 - Room 1

Lab ID#: 1710208B-10A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101318**	**Date of Collection:**	**10/4/17 9:57:00 AM**
Dil. Factor:	**17.6**	**Date of Analysis:**	**10/13/17 11:26 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	8.8	Not Detected	75	Not Detected
1,2-Dibromoethane (EDB)	8.8	Not Detected	68	Not Detected
Chlorobenzene	8.8	Not Detected	40	Not Detected
Ethyl Benzene	8.8	Not Detected	38	Not Detected
m,p-Xylene	8.8	Not Detected	38	Not Detected
o-Xylene	8.8	Not Detected	38	Not Detected
Styrene	8.8	Not Detected	37	Not Detected
Bromoform	8.8	Not Detected	91	Not Detected
Cumene	8.8	Not Detected	43	Not Detected
1,1,2,2-Tetrachloroethane	8.8	Not Detected	60	Not Detected
Propylbenzene	8.8	Not Detected	43	Not Detected
4-Ethyltoluene	8.8	Not Detected	43	Not Detected
1,3,5-Trimethylbenzene	8.8	Not Detected	43	Not Detected
1,2,4-Trimethylbenzene	8.8	Not Detected	43	Not Detected
1,3-Dichlorobenzene	8.8	Not Detected	53	Not Detected
1,4-Dichlorobenzene	8.8	Not Detected	53	Not Detected
alpha-Chlorotoluene	8.8	Not Detected	46	Not Detected
1,2-Dichlorobenzene	8.8	Not Detected	53	Not Detected
1,2,4-Trichlorobenzene	35	Not Detected	260	Not Detected
Hexachlorobutadiene	35	Not Detected	380	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	105	70-130
1,2-Dichloroethane-d4	117	70-130
4-Bromofluorobenzene	89	70-130

eurofins | Air Toxics

Client Sample ID: SS-03 #173847, Room 1 co-located

Lab ID#: 1710208B-11A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101319**	**Date of Collection:**	**10/4/17 9:57:00 AM**
Dil. Factor:	**22.5**	**Date of Analysis:**	**10/13/17 11:51 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	11	Not Detected	56	Not Detected
Freon 114	11	Not Detected	79	Not Detected
Chloromethane	110	Not Detected	230	Not Detected
Vinyl Chloride	11	Not Detected	29	Not Detected
1,3-Butadiene	11	Not Detected	25	Not Detected
Bromomethane	110	Not Detected	440	Not Detected
Chloroethane	45	Not Detected	120	Not Detected
Freon 11	11	Not Detected	63	Not Detected
Ethanol	45	Not Detected	85	Not Detected
Freon 113	11	Not Detected	86	Not Detected
1,1-Dichloroethene	11	Not Detected	45	Not Detected
Acetone	110	Not Detected	270	Not Detected
2-Propanol	45	Not Detected	110	Not Detected
Carbon Disulfide	45	Not Detected	140	Not Detected
3-Chloropropene	45	Not Detected	140	Not Detected
Methylene Chloride	110	Not Detected	390	Not Detected
Methyl tert-butyl ether	45	Not Detected	160	Not Detected
trans-1,2-Dichloroethene	11	Not Detected	45	Not Detected
Hexane	11	Not Detected	40	Not Detected
1,1-Dichloroethane	11	Not Detected	46	Not Detected
2-Butanone (Methyl Ethyl Ketone)	45	Not Detected	130	Not Detected
cis-1,2-Dichloroethene	11	Not Detected	45	Not Detected
Tetrahydrofuran	11	14	33	40
Chloroform	11	Not Detected	55	Not Detected
1,1,1-Trichloroethane	11	Not Detected	61	Not Detected
Cyclohexane	11	Not Detected	39	Not Detected
Carbon Tetrachloride	11	Not Detected	71	Not Detected
2,2,4-Trimethylpentane	11	Not Detected	52	Not Detected
Benzene	11	Not Detected	36	Not Detected
1,2-Dichloroethane	11	Not Detected	46	Not Detected
Heptane	11	Not Detected	46	Not Detected
Trichloroethene	11	3700	60	20000
1,2-Dichloropropane	11	Not Detected	52	Not Detected
1,4-Dioxane	45	Not Detected	160	Not Detected
Bromodichloromethane	11	Not Detected	75	Not Detected
cis-1,3-Dichloropropene	11	Not Detected	51	Not Detected
4-Methyl-2-pentanone	11	Not Detected	46	Not Detected
Toluene	11	Not Detected	42	Not Detected
trans-1,3-Dichloropropene	11	Not Detected	51	Not Detected
1,1,2-Trichloroethane	11	Not Detected	61	Not Detected
Tetrachloroethene	11	Not Detected	76	Not Detected
2-Hexanone	45	Not Detected	180	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-03 #173847, Room 1 co-located

Lab ID#: 1710208B-11A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101319**	**Date of Collection:**	**10/4/17 9:57:00 AM**
Dil. Factor:	**22.5**	**Date of Analysis:**	**10/13/17 11:51 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	11	Not Detected	96	Not Detected
1,2-Dibromoethane (EDB)	11	Not Detected	86	Not Detected
Chlorobenzene	11	Not Detected	52	Not Detected
Ethyl Benzene	11	Not Detected	49	Not Detected
m,p-Xylene	11	Not Detected	49	Not Detected
o-Xylene	11	Not Detected	49	Not Detected
Styrene	11	Not Detected	48	Not Detected
Bromoform	11	Not Detected	120	Not Detected
Cumene	11	Not Detected	55	Not Detected
1,1,2,2-Tetrachloroethane	11	Not Detected	77	Not Detected
Propylbenzene	11	Not Detected	55	Not Detected
4-Ethyltoluene	11	Not Detected	55	Not Detected
1,3,5-Trimethylbenzene	11	Not Detected	55	Not Detected
1,2,4-Trimethylbenzene	11	Not Detected	55	Not Detected
1,3-Dichlorobenzene	11	Not Detected	68	Not Detected
1,4-Dichlorobenzene	11	Not Detected	68	Not Detected
alpha-Chlorotoluene	11	Not Detected	58	Not Detected
1,2-Dichlorobenzene	11	Not Detected	68	Not Detected
1,2,4-Trichlorobenzene	45	Not Detected	330	Not Detected
Hexachlorobutadiene	45	Not Detected	480	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	106	70-130
1,2-Dichloroethane-d4	117	70-130
4-Bromofluorobenzene	88	70-130

eurofins | Air Toxics

Client Sample ID: SS-14 #173848, Room 1

Lab ID#: 1710208B-12A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101316**	**Date of Collection:**	**10/4/17 9:55:00 AM**
Dil. Factor:	**2.21**	**Date of Analysis:**	**10/13/17 09:05 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.5	Not Detected
Freon 114	1.1	Not Detected	7.7	Not Detected
Chloromethane	11	Not Detected	23	Not Detected
Vinyl Chloride	1.1	Not Detected	2.8	Not Detected
1,3-Butadiene	1.1	Not Detected	2.4	Not Detected
Bromomethane	11	Not Detected	43	Not Detected
Chloroethane	4.4	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.2	Not Detected
Ethanol	4.4	45	8.3	85
Freon 113	1.1	Not Detected	8.5	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Acetone	11	33	26	80
2-Propanol	4.4	Not Detected	11	Not Detected
Carbon Disulfide	4.4	Not Detected	14	Not Detected
3-Chloropropene	4.4	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	38	Not Detected
Methyl tert-butyl ether	4.4	Not Detected	16	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Hexane	1.1	Not Detected	3.9	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.5	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.4	4.6	13	13
cis-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Tetrahydrofuran	1.1	14	3.2	42
Chloroform	1.1	Not Detected	5.4	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.0	Not Detected
Cyclohexane	1.1	Not Detected	3.8	Not Detected
Carbon Tetrachloride	1.1	Not Detected	7.0	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.2	Not Detected
Benzene	1.1	Not Detected	3.5	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.5	Not Detected
Heptane	1.1	Not Detected	4.5	Not Detected
Trichloroethene	1.1	200	5.9	1000
1,2-Dichloropropane	1.1	Not Detected	5.1	Not Detected
1,4-Dioxane	4.4	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.4	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.0	Not Detected
4-Methyl-2-pentanone	1.1	1.6	4.5	6.6
Toluene	1.1	5.9	4.2	22
trans-1,3-Dichloropropene	1.1	Not Detected	5.0	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.0	Not Detected
Tetrachloroethene	1.1	Not Detected	7.5	Not Detected
2-Hexanone	4.4	Not Detected	18	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-14 #173848, Room 1

Lab ID#: 1710208B-12A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101316**	**Date of Collection:**	**10/4/17 9:55:00 AM**
Dil. Factor:	**2.21**	**Date of Analysis:**	**10/13/17 09:05 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.4	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.5	Not Detected
Chlorobenzene	1.1	Not Detected	5.1	Not Detected
Ethyl Benzene	1.1	2.4	4.8	10
m,p-Xylene	1.1	7.1	4.8	31
o-Xylene	1.1	3.3	4.8	14
Styrene	1.1	2.6	4.7	11
Bromoform	1.1	Not Detected	11	Not Detected
Cumene	1.1	Not Detected	5.4	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.6	Not Detected
Propylbenzene	1.1	Not Detected	5.4	Not Detected
4-Ethyltoluene	1.1	2.8	5.4	14
1,3,5-Trimethylbenzene	1.1	Not Detected	5.4	Not Detected
1,2,4-Trimethylbenzene	1.1	3.2	5.4	16
1,3-Dichlorobenzene	1.1	Not Detected	6.6	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.6	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.7	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.6	Not Detected
1,2,4-Trichlorobenzene	4.4	Not Detected	33	Not Detected
Hexachlorobutadiene	4.4	Not Detected	47	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	107	70-130
1,2-Dichloroethane-d4	116	70-130
4-Bromofluorobenzene	89	70-130

eurofins | Air Toxics

Client Sample ID: SS-04 #173849, Room 2

Lab ID#: 1710208B-13A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101320**	**Date of Collection:**	**10/4/17 10:15:00 AM**
Dil. Factor:	**2.24**	**Date of Analysis:**	**10/14/17 12:20 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.5	Not Detected
Freon 114	1.1	Not Detected	7.8	Not Detected
Chloromethane	11	Not Detected	23	Not Detected
Vinyl Chloride	1.1	Not Detected	2.9	Not Detected
1,3-Butadiene	1.1	Not Detected	2.5	Not Detected
Bromomethane	11	Not Detected	43	Not Detected
Chloroethane	4.5	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.3	Not Detected
Ethanol	4.5	28	8.4	54
Freon 113	1.1	Not Detected	8.6	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Acetone	11	30	27	71
2-Propanol	4.5	Not Detected	11	Not Detected
Carbon Disulfide	4.5	Not Detected	14	Not Detected
3-Chloropropene	4.5	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	39	Not Detected
Methyl tert-butyl ether	4.5	Not Detected	16	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Hexane	1.1	Not Detected	3.9	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.5	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.5	Not Detected	13	Not Detected
cis-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Tetrahydrofuran	1.1	13	3.3	38
Chloroform	1.1	Not Detected	5.5	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.1	Not Detected
Cyclohexane	1.1	Not Detected	3.8	Not Detected
Carbon Tetrachloride	1.1	Not Detected	7.0	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.2	Not Detected
Benzene	1.1	Not Detected	3.6	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.5	Not Detected
Heptane	1.1	Not Detected	4.6	Not Detected
Trichloroethene	1.1	1.6	6.0	8.5
1,2-Dichloropropane	1.1	Not Detected	5.2	Not Detected
1,4-Dioxane	4.5	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.5	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.1	Not Detected
4-Methyl-2-pentanone	1.1	1.2	4.6	4.8
Toluene	1.1	4.5	4.2	17
trans-1,3-Dichloropropene	1.1	Not Detected	5.1	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.1	Not Detected
Tetrachloroethene	1.1	Not Detected	7.6	Not Detected
2-Hexanone	4.5	Not Detected	18	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-04 #173849, Room 2

Lab ID#: 1710208B-13A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101320**	**Date of Collection:**	**10/4/17 10:15:00 AM**
Dil. Factor:	**2.24**	**Date of Analysis:**	**10/14/17 12:20 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.5	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.6	Not Detected
Chlorobenzene	1.1	Not Detected	5.2	Not Detected
Ethyl Benzene	1.1	1.8	4.9	8.0
m,p-Xylene	1.1	5.6	4.9	24
o-Xylene	1.1	2.5	4.9	11
Styrene	1.1	2.1	4.8	9.0
Bromoform	1.1	Not Detected	12	Not Detected
Cumene	1.1	Not Detected	5.5	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.7	Not Detected
Propylbenzene	1.1	Not Detected	5.5	Not Detected
4-Ethyltoluene	1.1	2.3	5.5	12
1,3,5-Trimethylbenzene	1.1	Not Detected	5.5	Not Detected
1,2,4-Trimethylbenzene	1.1	2.8	5.5	14
1,3-Dichlorobenzene	1.1	Not Detected	6.7	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.7	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.8	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.7	Not Detected
1,2,4-Trichlorobenzene	4.5	Not Detected	33	Not Detected
Hexachlorobutadiene	4.5	Not Detected	48	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	105	70-130
1,2-Dichloroethane-d4	116	70-130
4-Bromofluorobenzene	91	70-130

eurofins | Air Toxics

Client Sample ID: SS-05 #173850 Room 3

Lab ID#: 1710208B-14A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101321**	**Date of Collection:**	**10/4/17 10:34:00 AM**
Dil. Factor:	**2.21**	**Date of Analysis:**	**10/14/17 12:48 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.5	Not Detected
Freon 114	1.1	Not Detected	7.7	Not Detected
Chloromethane	11	Not Detected	23	Not Detected
Vinyl Chloride	1.1	Not Detected	2.8	Not Detected
1,3-Butadiene	1.1	Not Detected	2.4	Not Detected
Bromomethane	11	Not Detected	43	Not Detected
Chloroethane	4.4	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.2	Not Detected
Ethanol	4.4	55	8.3	100
Freon 113	1.1	Not Detected	8.5	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Acetone	11	40	26	96
2-Propanol	4.4	Not Detected	11	Not Detected
Carbon Disulfide	4.4	Not Detected	14	Not Detected
3-Chloropropene	4.4	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	38	Not Detected
Methyl tert-butyl ether	4.4	Not Detected	16	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Hexane	1.1	2.2	3.9	7.8
1,1-Dichloroethane	1.1	Not Detected	4.5	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.4	4.4	13	13
cis-1,2-Dichloroethene	1.1	Not Detected	4.4	Not Detected
Tetrahydrofuran	1.1	17	3.2	52
Chloroform	1.1	Not Detected	5.4	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.0	Not Detected
Cyclohexane	1.1	Not Detected	3.8	Not Detected
Carbon Tetrachloride	1.1	Not Detected	7.0	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.2	Not Detected
Benzene	1.1	Not Detected	3.5	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.5	Not Detected
Heptane	1.1	12	4.5	49
Trichloroethene	1.1	Not Detected	5.9	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.1	Not Detected
1,4-Dioxane	4.4	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.4	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.0	Not Detected
4-Methyl-2-pentanone	1.1	1.6	4.5	6.8
Toluene	1.1	6.7	4.2	25
trans-1,3-Dichloropropene	1.1	Not Detected	5.0	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.0	Not Detected
Tetrachloroethene	1.1	Not Detected	7.5	Not Detected
2-Hexanone	4.4	Not Detected	18	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-05 #173850 Room 3

Lab ID#: 1710208B-14A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101321**	**Date of Collection:**	**10/4/17 10:34:00 AM**
Dil. Factor:	**2.21**	**Date of Analysis:**	**10/14/17 12:48 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.4	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.5	Not Detected
Chlorobenzene	1.1	Not Detected	5.1	Not Detected
Ethyl Benzene	1.1	2.4	4.8	10
m,p-Xylene	1.1	7.3	4.8	32
o-Xylene	1.1	3.4	4.8	15
Styrene	1.1	2.5	4.7	11
Bromoform	1.1	Not Detected	11	Not Detected
Cumene	1.1	Not Detected	5.4	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.6	Not Detected
Propylbenzene	1.1	Not Detected	5.4	Not Detected
4-Ethyltoluene	1.1	2.7	5.4	13
1,3,5-Trimethylbenzene	1.1	Not Detected	5.4	Not Detected
1,2,4-Trimethylbenzene	1.1	3.1	5.4	15
1,3-Dichlorobenzene	1.1	Not Detected	6.6	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.6	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.7	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.6	Not Detected
1,2,4-Trichlorobenzene	4.4	Not Detected	33	Not Detected
Hexachlorobutadiene	4.4	Not Detected	47	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	108	70-130
1,2-Dichloroethane-d4	113	70-130
4-Bromofluorobenzene	92	70-130

eurofins | Air Toxics

Client Sample ID: SS-06 #173851 Room 5

Lab ID#: 1710208B-15A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101322**	**Date of Collection:**	**10/4/17 10:39:00 AM**
Dil. Factor:	**2.16**	**Date of Analysis:**	**10/14/17 01:17 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.3	Not Detected
Freon 114	1.1	Not Detected	7.6	Not Detected
Chloromethane	11	Not Detected	22	Not Detected
Vinyl Chloride	1.1	Not Detected	2.8	Not Detected
1,3-Butadiene	1.1	Not Detected	2.4	Not Detected
Bromomethane	11	Not Detected	42	Not Detected
Chloroethane	4.3	Not Detected	11	Not Detected
Freon 11	1.1	Not Detected	6.1	Not Detected
Ethanol	4.3	76	8.1	140
Freon 113	1.1	Not Detected	8.3	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.3	Not Detected
Acetone	11	62	26	150
2-Propanol	4.3	6.0	11	15
Carbon Disulfide	4.3	Not Detected	13	Not Detected
3-Chloropropene	4.3	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	38	Not Detected
Methyl tert-butyl ether	4.3	Not Detected	16	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.3	Not Detected
Hexane	1.1	1.1	3.8	4.0
1,1-Dichloroethane	1.1	Not Detected	4.4	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.3	7.9	13	23
cis-1,2-Dichloroethene	1.1	Not Detected	4.3	Not Detected
Tetrahydrofuran	1.1	18	3.2	53
Chloroform	1.1	Not Detected	5.3	Not Detected
1,1,1-Trichloroethane	1.1	11	5.9	60
Cyclohexane	1.1	Not Detected	3.7	Not Detected
Carbon Tetrachloride	1.1	Not Detected	6.8	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.0	Not Detected
Benzene	1.1	Not Detected	3.4	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.4	Not Detected
Heptane	1.1	Not Detected	4.4	Not Detected
Trichloroethene	1.1	Not Detected	5.8	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.0	Not Detected
1,4-Dioxane	4.3	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.2	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	4.9	Not Detected
4-Methyl-2-pentanone	1.1	1.6	4.4	6.6
Toluene	1.1	6.5	4.1	24
trans-1,3-Dichloropropene	1.1	Not Detected	4.9	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	5.9	Not Detected
Tetrachloroethene	1.1	Not Detected	7.3	Not Detected
2-Hexanone	4.3	Not Detected	18	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-06 #173851 Room 5

Lab ID#: 1710208B-15A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101322**	**Date of Collection: 10/4/17 10:39:00 AM**	
Dil. Factor:	**2.16**	**Date of Analysis: 10/14/17 01:17 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.2	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.3	Not Detected
Chlorobenzene	1.1	Not Detected	5.0	Not Detected
Ethyl Benzene	1.1	2.4	4.7	10
m,p-Xylene	1.1	6.9	4.7	30
o-Xylene	1.1	3.2	4.7	14
Styrene	1.1	2.4	4.6	10
Bromoform	1.1	Not Detected	11	Not Detected
Cumene	1.1	Not Detected	5.3	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.4	Not Detected
Propylbenzene	1.1	Not Detected	5.3	Not Detected
4-Ethyltoluene	1.1	2.6	5.3	13
1,3,5-Trimethylbenzene	1.1	Not Detected	5.3	Not Detected
1,2,4-Trimethylbenzene	1.1	3.1	5.3	15
1,3-Dichlorobenzene	1.1	Not Detected	6.5	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.5	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.6	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.5	Not Detected
1,2,4-Trichlorobenzene	4.3	Not Detected	32	Not Detected
Hexachlorobutadiene	4.3	Not Detected	46	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	106	70-130
1,2-Dichloroethane-d4	117	70-130
4-Bromofluorobenzene	92	70-130

eurofins | Air Toxics

Client Sample ID: SS-07 #173852 Room 6

Lab ID#: 1710208B-16A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101323**	**Date of Collection:**	**10/4/17 10:58:00 AM**
Dil. Factor:	**2.28**	**Date of Analysis:**	**10/14/17 01:45 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.6	Not Detected
Freon 114	1.1	Not Detected	8.0	Not Detected
Chloromethane	11	Not Detected	24	Not Detected
Vinyl Chloride	1.1	Not Detected	2.9	Not Detected
1,3-Butadiene	1.1	Not Detected	2.5	Not Detected
Bromomethane	11	Not Detected	44	Not Detected
Chloroethane	4.6	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.4	Not Detected
Ethanol	4.6	56	8.6	110
Freon 113	1.1	Not Detected	8.7	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Acetone	11	41	27	97
2-Propanol	4.6	5.3	11	13
Carbon Disulfide	4.6	Not Detected	14	Not Detected
3-Chloropropene	4.6	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	40	Not Detected
Methyl tert-butyl ether	4.6	Not Detected	16	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Hexane	1.1	Not Detected	4.0	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.6	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.6	5.8	13	17
cis-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Tetrahydrofuran	1.1	19	3.4	55
Chloroform	1.1	Not Detected	5.6	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Cyclohexane	1.1	Not Detected	3.9	Not Detected
Carbon Tetrachloride	1.1	Not Detected	7.2	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.3	Not Detected
Benzene	1.1	Not Detected	3.6	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.6	Not Detected
Heptane	1.1	Not Detected	4.7	Not Detected
Trichloroethene	1.1	Not Detected	6.1	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.3	Not Detected
1,4-Dioxane	4.6	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.6	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.2	Not Detected
4-Methyl-2-pentanone	1.1	1.5	4.7	6.2
Toluene	1.1	10	4.3	38
trans-1,3-Dichloropropene	1.1	Not Detected	5.2	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Tetrachloroethene	1.1	Not Detected	7.7	Not Detected
2-Hexanone	4.6	Not Detected	19	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-07 #173852 Room 6

Lab ID#: 1710208B-16A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101323**	**Date of Collection:**	**10/4/17 10:58:00 AM**
Dil. Factor:	**2.28**	**Date of Analysis:**	**10/14/17 01:45 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.7	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.8	Not Detected
Chlorobenzene	1.1	Not Detected	5.2	Not Detected
Ethyl Benzene	1.1	3.0	4.9	13
m,p-Xylene	1.1	8.1	5.0	35
o-Xylene	1.1	3.9	5.0	17
Styrene	1.1	2.5	4.8	11
Bromoform	1.1	Not Detected	12	Not Detected
Cumene	1.1	Not Detected	5.6	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.8	Not Detected
Propylbenzene	1.1	Not Detected	5.6	Not Detected
4-Ethyltoluene	1.1	2.9	5.6	14
1,3,5-Trimethylbenzene	1.1	Not Detected	5.6	Not Detected
1,2,4-Trimethylbenzene	1.1	3.5	5.6	17
1,3-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.9	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.8	Not Detected
1,2,4-Trichlorobenzene	4.6	Not Detected	34	Not Detected
Hexachlorobutadiene	4.6	Not Detected	49	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	106	70-130
1,2-Dichloroethane-d4	112	70-130
4-Bromofluorobenzene	92	70-130

eurofins | Air Toxics

Client Sample ID: SS-08 #173853 Room 7

Lab ID#: 1710208B-17A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101324**	**Date of Collection:**	**10/4/17 11:15:00 AM**
Dil. Factor:	**2.29**	**Date of Analysis:**	**10/14/17 02:14 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.7	Not Detected
Freon 114	1.1	Not Detected	8.0	Not Detected
Chloromethane	11	Not Detected	24	Not Detected
Vinyl Chloride	1.1	Not Detected	2.9	Not Detected
1,3-Butadiene	1.1	Not Detected	2.5	Not Detected
Bromomethane	11	Not Detected	44	Not Detected
Chloroethane	4.6	Not Detected	12	Not Detected
Freon 11	1.1	Not Detected	6.4	Not Detected
Ethanol	4.6	52	8.6	98
Freon 113	1.1	Not Detected	8.8	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Acetone	11	31	27	74
2-Propanol	4.6	6.4	11	16
Carbon Disulfide	4.6	Not Detected	14	Not Detected
3-Chloropropene	4.6	Not Detected	14	Not Detected
Methylene Chloride	11	Not Detected	40	Not Detected
Methyl tert-butyl ether	4.6	Not Detected	16	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Hexane	1.1	Not Detected	4.0	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.6	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.6	6.2	14	18
cis-1,2-Dichloroethene	1.1	Not Detected	4.5	Not Detected
Tetrahydrofuran	1.1	2.4	3.4	7.1
Chloroform	1.1	Not Detected	5.6	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Cyclohexane	1.1	1.2	3.9	4.2
Carbon Tetrachloride	1.1	Not Detected	7.2	Not Detected
2,2,4-Trimethylpentane	1.1	1.3	5.3	6.2
Benzene	1.1	1.3	3.6	4.2
1,2-Dichloroethane	1.1	Not Detected	4.6	Not Detected
Heptane	1.1	1.3	4.7	5.3
Trichloroethene	1.1	Not Detected	6.2	Not Detected
1,2-Dichloropropane	1.1	Not Detected	5.3	Not Detected
1,4-Dioxane	4.6	Not Detected	16	Not Detected
Bromodichloromethane	1.1	Not Detected	7.7	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	5.2	Not Detected
4-Methyl-2-pentanone	1.1	Not Detected	4.7	Not Detected
Toluene	1.1	11	4.3	40
trans-1,3-Dichloropropene	1.1	Not Detected	5.2	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	6.2	Not Detected
Tetrachloroethene	1.1	Not Detected	7.8	Not Detected
2-Hexanone	4.6	Not Detected	19	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-08 #173853 Room 7

Lab ID#: 1710208B-17A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101324**	**Date of Collection:**	**10/4/17 11:15:00 AM**
Dil. Factor:	**2.29**	**Date of Analysis:**	**10/14/17 02:14 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.8	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.8	Not Detected
Chlorobenzene	1.1	Not Detected	5.3	Not Detected
Ethyl Benzene	1.1	2.4	5.0	10
m,p-Xylene	1.1	8.9	5.0	38
o-Xylene	1.1	3.5	5.0	15
Styrene	1.1	Not Detected	4.9	Not Detected
Bromoform	1.1	Not Detected	12	Not Detected
Cumene	1.1	Not Detected	5.6	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.9	Not Detected
Propylbenzene	1.1	Not Detected	5.6	Not Detected
4-Ethyltoluene	1.1	4.2	5.6	20
1,3,5-Trimethylbenzene	1.1	Not Detected	5.6	Not Detected
1,2,4-Trimethylbenzene	1.1	4.4	5.6	22
1,3-Dichlorobenzene	1.1	Not Detected	6.9	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.9	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.9	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.9	Not Detected
1,2,4-Trichlorobenzene	4.6	Not Detected	34	Not Detected
Hexachlorobutadiene	4.6	Not Detected	49	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	105	70-130
1,2-Dichloroethane-d4	114	70-130
4-Bromofluorobenzene	98	70-130

eurofins | Air Toxics

Client Sample ID: SS-09 #173854 Room 9

Lab ID#: 1710208B-18A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101326**	**Date of Collection:**	**10/4/17 11:14:00 AM**
Dil. Factor:	**2.31**	**Date of Analysis:**	**10/14/17 03:08 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.2	Not Detected	5.7	Not Detected
Freon 114	1.2	Not Detected	8.1	Not Detected
Chloromethane	12	Not Detected	24	Not Detected
Vinyl Chloride	1.2	Not Detected	3.0	Not Detected
1,3-Butadiene	1.2	Not Detected	2.6	Not Detected
Bromomethane	12	Not Detected	45	Not Detected
Chloroethane	4.6	Not Detected	12	Not Detected
Freon 11	1.2	Not Detected	6.5	Not Detected
Ethanol	4.6	59	8.7	110
Freon 113	1.2	Not Detected	8.8	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.6	Not Detected
Acetone	12	48	27	110
2-Propanol	4.6	9.0	11	22
Carbon Disulfide	4.6	Not Detected	14	Not Detected
3-Chloropropene	4.6	Not Detected	14	Not Detected
Methylene Chloride	12	Not Detected	40	Not Detected
Methyl tert-butyl ether	4.6	Not Detected	17	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.6	Not Detected
Hexane	1.2	Not Detected	4.1	Not Detected
1,1-Dichloroethane	1.2	Not Detected	4.7	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.6	5.2	14	15
cis-1,2-Dichloroethene	1.2	Not Detected	4.6	Not Detected
Tetrahydrofuran	1.2	18	3.4	52
Chloroform	1.2	Not Detected	5.6	Not Detected
1,1,1-Trichloroethane	1.2	Not Detected	6.3	Not Detected
Cyclohexane	1.2	Not Detected	4.0	Not Detected
Carbon Tetrachloride	1.2	Not Detected	7.3	Not Detected
2,2,4-Trimethylpentane	1.2	Not Detected	5.4	Not Detected
Benzene	1.2	Not Detected	3.7	Not Detected
1,2-Dichloroethane	1.2	Not Detected	4.7	Not Detected
Heptane	1.2	Not Detected	4.7	Not Detected
Trichloroethene	1.2	Not Detected	6.2	Not Detected
1,2-Dichloropropane	1.2	Not Detected	5.3	Not Detected
1,4-Dioxane	4.6	Not Detected	17	Not Detected
Bromodichloromethane	1.2	Not Detected	7.7	Not Detected
cis-1,3-Dichloropropene	1.2	Not Detected	5.2	Not Detected
4-Methyl-2-pentanone	1.2	1.5	4.7	6.3
Toluene	1.2	5.3	4.4	20
trans-1,3-Dichloropropene	1.2	Not Detected	5.2	Not Detected
1,1,2-Trichloroethane	1.2	Not Detected	6.3	Not Detected
Tetrachloroethene	1.2	Not Detected	7.8	Not Detected
2-Hexanone	4.6	Not Detected	19	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-09 #173854 Room 9

Lab ID#: 1710208B-18A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101326**	**Date of Collection:**	**10/4/17 11:14:00 AM**
Dil. Factor:	**2.31**	**Date of Analysis:**	**10/14/17 03:08 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.2	Not Detected	9.8	Not Detected
1,2-Dibromoethane (EDB)	1.2	Not Detected	8.9	Not Detected
Chlorobenzene	1.2	Not Detected	5.3	Not Detected
Ethyl Benzene	1.2	2.3	5.0	10
m,p-Xylene	1.2	6.6	5.0	29
o-Xylene	1.2	3.2	5.0	14
Styrene	1.2	2.3	4.9	9.9
Bromoform	1.2	Not Detected	12	Not Detected
Cumene	1.2	Not Detected	5.7	Not Detected
1,1,2,2-Tetrachloroethane	1.2	Not Detected	7.9	Not Detected
Propylbenzene	1.2	Not Detected	5.7	Not Detected
4-Ethyltoluene	1.2	3.1	5.7	15
1,3,5-Trimethylbenzene	1.2	Not Detected	5.7	Not Detected
1,2,4-Trimethylbenzene	1.2	3.5	5.7	17
1,3-Dichlorobenzene	1.2	Not Detected	6.9	Not Detected
1,4-Dichlorobenzene	1.2	Not Detected	6.9	Not Detected
alpha-Chlorotoluene	1.2	Not Detected	6.0	Not Detected
1,2-Dichlorobenzene	1.2	Not Detected	6.9	Not Detected
1,2,4-Trichlorobenzene	4.6	Not Detected	34	Not Detected
Hexachlorobutadiene	4.6	Not Detected	49	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	105	70-130
1,2-Dichloroethane-d4	113	70-130
4-Bromofluorobenzene	94	70-130

eurofins | Air Toxics

Client Sample ID: SS-10 #173855 Room 8

Lab ID#: 1710208B-19A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101327**	**Date of Collection:**	**10/4/17 11:36:00 AM**
Dil. Factor:	**2.13**	**Date of Analysis:**	**10/14/17 03:36 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	1.1	Not Detected	5.3	Not Detected
Freon 114	1.1	Not Detected	7.4	Not Detected
Chloromethane	11	Not Detected	22	Not Detected
Vinyl Chloride	1.1	Not Detected	2.7	Not Detected
1,3-Butadiene	1.1	Not Detected	2.4	Not Detected
Bromomethane	11	Not Detected	41	Not Detected
Chloroethane	4.3	Not Detected	11	Not Detected
Freon 11	1.1	Not Detected	6.0	Not Detected
Ethanol	4.3	72	8.0	130
Freon 113	1.1	Not Detected	8.2	Not Detected
1,1-Dichloroethene	1.1	Not Detected	4.2	Not Detected
Acetone	11	77	25	180
2-Propanol	4.3	6.5	10	16
Carbon Disulfide	4.3	Not Detected	13	Not Detected
3-Chloropropene	4.3	Not Detected	13	Not Detected
Methylene Chloride	11	Not Detected	37	Not Detected
Methyl tert-butyl ether	4.3	Not Detected	15	Not Detected
trans-1,2-Dichloroethene	1.1	Not Detected	4.2	Not Detected
Hexane	1.1	Not Detected	3.8	Not Detected
1,1-Dichloroethane	1.1	Not Detected	4.3	Not Detected
2-Butanone (Methyl Ethyl Ketone)	4.3	10	12	31
cis-1,2-Dichloroethene	1.1	Not Detected	4.2	Not Detected
Tetrahydrofuran	1.1	2.6	3.1	7.7
Chloroform	1.1	Not Detected	5.2	Not Detected
1,1,1-Trichloroethane	1.1	Not Detected	5.8	Not Detected
Cyclohexane	1.1	Not Detected	3.7	Not Detected
Carbon Tetrachloride	1.1	Not Detected	6.7	Not Detected
2,2,4-Trimethylpentane	1.1	Not Detected	5.0	Not Detected
Benzene	1.1	Not Detected	3.4	Not Detected
1,2-Dichloroethane	1.1	Not Detected	4.3	Not Detected
Heptane	1.1	Not Detected	4.4	Not Detected
Trichloroethene	1.1	Not Detected	5.7	Not Detected
1,2-Dichloropropane	1.1	Not Detected	4.9	Not Detected
1,4-Dioxane	4.3	Not Detected	15	Not Detected
Bromodichloromethane	1.1	Not Detected	7.1	Not Detected
cis-1,3-Dichloropropene	1.1	Not Detected	4.8	Not Detected
4-Methyl-2-pentanone	1.1	Not Detected	4.4	Not Detected
Toluene	1.1	8.8	4.0	33
trans-1,3-Dichloropropene	1.1	Not Detected	4.8	Not Detected
1,1,2-Trichloroethane	1.1	Not Detected	5.8	Not Detected
Tetrachloroethene	1.1	Not Detected	7.2	Not Detected
2-Hexanone	4.3	Not Detected	17	Not Detected

eurofins | Air Toxics

Client Sample ID: SS-10 #173855 Room 8

Lab ID#: 1710208B-19A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101327**	**Date of Collection:**	**10/4/17 11:36:00 AM**
Dil. Factor:	**2.13**	**Date of Analysis:**	**10/14/17 03:36 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	1.1	Not Detected	9.1	Not Detected
1,2-Dibromoethane (EDB)	1.1	Not Detected	8.2	Not Detected
Chlorobenzene	1.1	Not Detected	4.9	Not Detected
Ethyl Benzene	1.1	2.4	4.6	10
m,p-Xylene	1.1	9.0	4.6	39
o-Xylene	1.1	3.3	4.6	14
Styrene	1.1	Not Detected	4.5	Not Detected
Bromoform	1.1	Not Detected	11	Not Detected
Cumene	1.1	Not Detected	5.2	Not Detected
1,1,2,2-Tetrachloroethane	1.1	Not Detected	7.3	Not Detected
Propylbenzene	1.1	Not Detected	5.2	Not Detected
4-Ethyltoluene	1.1	5.0	5.2	24
1,3,5-Trimethylbenzene	1.1	1.2	5.2	6.0
1,2,4-Trimethylbenzene	1.1	5.2	5.2	25
1,3-Dichlorobenzene	1.1	Not Detected	6.4	Not Detected
1,4-Dichlorobenzene	1.1	Not Detected	6.4	Not Detected
alpha-Chlorotoluene	1.1	Not Detected	5.5	Not Detected
1,2-Dichlorobenzene	1.1	Not Detected	6.4	Not Detected
1,2,4-Trichlorobenzene	4.3	Not Detected	32	Not Detected
Hexachlorobutadiene	4.3	Not Detected	45	Not Detected

Container Type: 1 Liter Summa Canister

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130
1,2-Dichloroethane-d4	116	70-130
4-Bromofluorobenzene	100	70-130

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1710208B-20A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101305**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/13/17 01:52 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.5	Not Detected
Chloromethane	5.0	Not Detected	10	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	5.0	Not Detected	19	Not Detected
Chloroethane	2.0	Not Detected	5.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	5.0	Not Detected	12	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Carbon Disulfide	2.0	Not Detected	6.2	Not Detected
3-Chloropropene	2.0	Not Detected	6.3	Not Detected
Methylene Chloride	5.0	Not Detected	17	Not Detected
Methyl tert-butyl ether	2.0	Not Detected	7.2	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	2.0	Not Detected	5.9	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
2,2,4-Trimethylpentane	0.50	Not Detected	2.3	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
2-Hexanone	2.0	Not Detected	8.2	Not Detected

eurofins | Air Toxics

Client Sample ID: Lab Blank

Lab ID#: 1710208B-20A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101305**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/13/17 01:52 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.8	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130
1,2-Dichloroethane-d4	116	70-130
4-Bromofluorobenzene	85	70-130

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1710208B-21A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101302**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/13/17 09:29 AM**	

Compound	%Recovery
Freon 12	108
Freon 114	95
Chloromethane	124
Vinyl Chloride	119
1,3-Butadiene	118
Bromomethane	113
Chloroethane	119
Freon 11	101
Ethanol	116
Freon 113	89
1,1-Dichloroethene	102
Acetone	104
2-Propanol	120
Carbon Disulfide	117
3-Chloropropene	107
Methylene Chloride	128
Methyl tert-butyl ether	109
trans-1,2-Dichloroethene	112
Hexane	118
1,1-Dichloroethane	124
2-Butanone (Methyl Ethyl Ketone)	113
cis-1,2-Dichloroethene	110
Tetrahydrofuran	121
Chloroform	114
1,1,1-Trichloroethane	105
Cyclohexane	111
Carbon Tetrachloride	97
2,2,4-Trimethylpentane	120
Benzene	124
1,2-Dichloroethane	126
Heptane	123
Trichloroethene	110
1,2-Dichloropropane	134 Q
1,4-Dioxane	112
Bromodichloromethane	120
cis-1,3-Dichloropropene	117
4-Methyl-2-pentanone	121
Toluene	116
trans-1,3-Dichloropropene	122
1,1,2-Trichloroethane	118
Tetrachloroethene	99
2-Hexanone	126

eurofins | Air Toxics

Client Sample ID: CCV

Lab ID#: 1710208B-21A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101302**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/13/17 09:29 AM**	

Compound	%Recovery
Dibromochloromethane	106
1,2-Dibromoethane (EDB)	112
Chlorobenzene	105
Ethyl Benzene	108
m,p-Xylene	109
o-Xylene	106
Styrene	125
Bromoform	102
Cumene	108
1,1,2,2-Tetrachloroethane	126
Propylbenzene	113
4-Ethyltoluene	108
1,3,5-Trimethylbenzene	110
1,2,4-Trimethylbenzene	103
1,3-Dichlorobenzene	101
1,4-Dichlorobenzene	99
alpha-Chlorotoluene	118
1,2-Dichlorobenzene	101
1,2,4-Trichlorobenzene	91
Hexachlorobutadiene	95

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	109	70-130
1,2-Dichloroethane-d4	118	70-130
4-Bromofluorobenzene	92	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1710208B-22A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101303**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/13/17 09:56 AM**	

Compound	%Recovery	Method Limits
Freon 12	114	70-130
Freon 114	103	70-130
Chloromethane	128	70-130
Vinyl Chloride	127	70-130
1,3-Butadiene	125	70-130
Bromomethane	117	70-130
Chloroethane	126	70-130
Freon 11	106	70-130
Ethanol	128	70-130
Freon 113	91	70-130
1,1-Dichloroethene	104	70-130
Acetone	109	70-130
2-Propanol	129	70-130
Carbon Disulfide	106	70-130
3-Chloropropene	107	70-130
Methylene Chloride	130	70-130
Methyl tert-butyl ether	108	70-130
trans-1,2-Dichloroethene	99	70-130
Hexane	120	70-130
1,1-Dichloroethane	128	70-130
2-Butanone (Methyl Ethyl Ketone)	114	70-130
cis-1,2-Dichloroethene	123	70-130
Tetrahydrofuran	120	70-130
Chloroform	116	70-130
1,1,1-Trichloroethane	105	70-130
Cyclohexane	115	70-130
Carbon Tetrachloride	97	70-130
2,2,4-Trimethylpentane	126	70-130
Benzene	124	70-130
1,2-Dichloroethane	128	70-130
Heptane	121	70-130
Trichloroethene	110	70-130
1,2-Dichloropropane	134 Q	70-130
1,4-Dioxane	106	70-130
Bromodichloromethane	120	70-130
cis-1,3-Dichloropropene	111	70-130
4-Methyl-2-pentanone	120	70-130
Toluene	113	70-130
trans-1,3-Dichloropropene	121	70-130
1,1,2-Trichloroethane	115	70-130
Tetrachloroethene	98	70-130
2-Hexanone	124	70-130

eurofins | Air Toxics

Client Sample ID: LCS

Lab ID#: 1710208B-22A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101303**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/13/17 09:56 AM**	

Compound	%Recovery	Method Limits
Dibromochloromethane	105	70-130
1,2-Dibromoethane (EDB)	110	70-130
Chlorobenzene	104	70-130
Ethyl Benzene	106	70-130
m,p-Xylene	107	70-130
o-Xylene	108	70-130
Styrene	124	70-130
Bromoform	102	70-130
Cumene	106	70-130
1,1,2,2-Tetrachloroethane	125	70-130
Propylbenzene	113	70-130
4-Ethyltoluene	107	70-130
1,3,5-Trimethylbenzene	108	70-130
1,2,4-Trimethylbenzene	102	70-130
1,3-Dichlorobenzene	101	70-130
1,4-Dichlorobenzene	100	70-130
alpha-Chlorotoluene	121	70-130
1,2-Dichlorobenzene	102	70-130
1,2,4-Trichlorobenzene	99	70-130
Hexachlorobutadiene	104	70-130

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	107	70-130
1,2-Dichloroethane-d4	120	70-130
4-Bromofluorobenzene	91	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1710208B-22AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101304**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/13/17 10:23 AM**	

Compound	%Recovery	Method Limits
Freon 12	115	70-130
Freon 114	102	70-130
Chloromethane	129	70-130
Vinyl Chloride	128	70-130
1,3-Butadiene	122	70-130
Bromomethane	118	70-130
Chloroethane	129	70-130
Freon 11	107	70-130
Ethanol	128	70-130
Freon 113	92	70-130
1,1-Dichloroethene	106	70-130
Acetone	110	70-130
2-Propanol	131 Q	70-130
Carbon Disulfide	108	70-130
3-Chloropropene	108	70-130
Methylene Chloride	131 Q	70-130
Methyl tert-butyl ether	110	70-130
trans-1,2-Dichloroethene	98	70-130
Hexane	123	70-130
1,1-Dichloroethane	130	70-130
2-Butanone (Methyl Ethyl Ketone)	115	70-130
cis-1,2-Dichloroethene	124	70-130
Tetrahydrofuran	126	70-130
Chloroform	117	70-130
1,1,1-Trichloroethane	108	70-130
Cyclohexane	114	70-130
Carbon Tetrachloride	97	70-130
2,2,4-Trimethylpentane	127	70-130
Benzene	123	70-130
1,2-Dichloroethane	126	70-130
Heptane	121	70-130
Trichloroethene	111	70-130
1,2-Dichloropropane	134 Q	70-130
1,4-Dioxane	106	70-130
Bromodichloromethane	120	70-130
cis-1,3-Dichloropropene	110	70-130
4-Methyl-2-pentanone	121	70-130
Toluene	113	70-130
trans-1,3-Dichloropropene	122	70-130
1,1,2-Trichloroethane	114	70-130
Tetrachloroethene	97	70-130
2-Hexanone	124	70-130

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1710208B-22AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**17101304**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/13/17 10:23 AM**	

Compound	%Recovery	Method Limits
Dibromochloromethane	104	70-130
1,2-Dibromoethane (EDB)	110	70-130
Chlorobenzene	103	70-130
Ethyl Benzene	104	70-130
m,p-Xylene	105	70-130
o-Xylene	107	70-130
Styrene	123	70-130
Bromoform	101	70-130
Cumene	105	70-130
1,1,2,2-Tetrachloroethane	123	70-130
Propylbenzene	113	70-130
4-Ethyltoluene	106	70-130
1,3,5-Trimethylbenzene	107	70-130
1,2,4-Trimethylbenzene	101	70-130
1,3-Dichlorobenzene	100	70-130
1,4-Dichlorobenzene	99	70-130
alpha-Chlorotoluene	120	70-130
1,2-Dichlorobenzene	101	70-130
1,2,4-Trichlorobenzene	102	70-130
Hexachlorobutadiene	105	70-130

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	108	70-130
1,2-Dichloroethane-d4	115	70-130
4-Bromofluorobenzene	91	70-130

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171006007

Valerie Wilder
Hazardous Waste Program

Report Date: 10/19/2017

Sample: AD08989

Customer #: 173782

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:25:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-01 # 173782 Room 1 west end
Can # 6L1642 Start PSI = 30 End PSI = 5.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.17	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.22	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.17	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.13	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.063	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.24	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.13	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.19	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	1.6	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.50	ug/m3	04
TO-15	Chloroethane/TO-15	<0.21	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.15	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<1.6	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.12	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	1.3	ug/m3	04
TO-15	Freon 114/TO-15	<0.22	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	2.7	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.57	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	1.2	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.21	ug/m3	ND, 04
TO-15	Toluene/TO-15	7.3	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.63	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	2.1	ug/m3	04
TO-15	Vinyl Chloride/TO-15	<0.040	ug/m3	ND, 04

Sample: AD08990

Customer #: 173783

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:25:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-01 # 173783 Room 1 co-located
Can # 6L1568 Start PSI = 26.0 End PSI = 3.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.16	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.20	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.16	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.12	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.059	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.23	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.12	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.18	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	1.6	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.52	ug/m3	04
TO-15	Chloroethane/TO-15	<0.20	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.14	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<1.5	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.12	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	1.3	ug/m3	04
TO-15	Freon 114/TO-15	<0.21	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	2.7	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.54	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	1.2	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.20	ug/m3	ND, 04
TO-15	Toluene/TO-15	7.1	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.59	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	2.1	ug/m3	04
TO-15	Vinyl Chloride/TO-15	<0.038	ug/m3	ND, 04

Sample: AD08991

Customer #: 173784

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:29:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-02 # 173784 Room 1 shelving
Can # 6L0622 Start PSI = 28.0 End PSI = 7.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.21	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.26	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.21	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.15	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.075	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.29	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.15	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.23	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	1.6	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.49	ug/m3	04
TO-15	Chloroethane/TO-15	<0.25	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.18	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<2.0	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.15	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	1.2	ug/m3	04
TO-15	Freon 114/TO-15	<0.26	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	2.5	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.68	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	1.2	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.26	ug/m3	ND, 04
TO-15	Toluene/TO-15	6.5	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.75	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	1.7	ug/m3	04
TO-15	Vinyl Chloride/TO-15	<0.048	ug/m3	ND, 04

Sample: AD08992

Customer #: 173785

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:34:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-03 # 173785 Room 2 middle shelf
Can # 6L0540 Start PSI = 29.5 End PSI = 5.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.23	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.14	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.067	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.26	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.14	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.20	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	1.0	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.49	ug/m3	04
TO-15	Chloroethane/TO-15	<0.22	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.16	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<1.7	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.13	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	1.6	ug/m3	04
TO-15	Freon 114/TO-15	<0.24	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	3.4	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.61	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	1.6	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.23	ug/m3	ND, 04
TO-15	Toluene/TO-15	9.1	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.67	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	0.82	ug/m3	04
TO-15	Vinyl Chloride/TO-15	<0.043	ug/m3	ND, 04

Sample: AD08993

Customer #: 173786

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:36:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-04 # 173786 Room 3 middle shelf
Can # 6L1527 Start PSI = 29 End PSI = 5.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.17	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.21	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.17	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.12	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.061	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.24	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.12	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.18	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	0.64	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.50	ug/m3	04
TO-15	Chloroethane/TO-15	<0.20	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.15	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<1.6	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.12	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	4.2	ug/m3	04
TO-15	Freon 114/TO-15	<0.22	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	9.6	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.56	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	4.7	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.21	ug/m3	ND, 04
TO-15	Toluene/TO-15	22	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.61	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	0.40	ug/m3	04
TO-15	Vinyl Chloride/TO-15	0.047	ug/m3	04

Sample: AD08994

Customer #: 173787

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:43:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-05 # 173787 Room 4
Can # 6L0070 Start PSI = 30 End PSI = 7.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.46	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.58	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.46	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.34	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.17	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.65	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	1.4	ug/m3	04
TO-15	1,4-Dichlorobenzene/TO-15	<0.51	ug/m3	ND, 04
TO-15	Benzene/TO-15	<0.68	ug/m3	ND, 04
TO-15	Carbon Tetrachloride/TO-15	<0.53	ug/m3	ND, 04
TO-15	Chloroethane/TO-15	<0.56	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.42	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<4.4	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.34	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	46	ug/m3	04
TO-15	Freon 114/TO-15	<0.59	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	140	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<1.5	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	71	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.58	ug/m3	ND, 04
TO-15	Toluene/TO-15	30	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<1.7	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	<0.46	ug/m3	ND, 04
TO-15	Vinyl Chloride/TO-15	<0.11	ug/m3	ND, 04

Sample: AD08995

Customer #: 173788

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:46:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-06 # 173788 Room 5 middle of room
Can # 6L1242 Start PSI = 30 End PSI = 6.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.22	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.13	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.065	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.25	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	0.30	ug/m3	04
TO-15	1,4-Dichlorobenzene/TO-15	<0.20	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	0.27	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.51	ug/m3	04
TO-15	Chloroethane/TO-15	<0.22	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.16	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<1.7	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.13	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	12	ug/m3	04
TO-15	Freon 114/TO-15	<0.23	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	29	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.59	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	13	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.22	ug/m3	ND, 04
TO-15	Toluene/TO-15	32	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.65	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	<0.18	ug/m3	ND, 04
TO-15	Vinyl Chloride/TO-15	<0.042	ug/m3	ND, 04

Sample: AD08996

Customer #: 173789

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:48:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-07 # 173789 Room 6 workstation shelf
Can # 6L0742 Start PSI = 28 End PSI = 6.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.23	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.14	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.067	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.26	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	0.28	ug/m3	04
TO-15	1,4-Dichlorobenzene/TO-15	<0.20	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	0.30	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.49	ug/m3	04
TO-15	Chloroethane/TO-15	<0.22	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.17	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<1.8	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.13	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	9.6	ug/m3	04
TO-15	Freon 114/TO-15	<0.24	ug/m3	ND, 04
TO-15	Freon 12/TO-15	1.9	ug/m3	04
TO-15	m,p-Xylene/TO-15	25	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.61	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	12	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.23	ug/m3	ND, 04
TO-15	Toluene/TO-15	20	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.67	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	<0.18	ug/m3	ND, 04
TO-15	Vinyl Chloride/TO-15	<0.043	ug/m3	ND, 04

Sample: AD08997

Customer #: 173790

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:49:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-08 # 173790 Room 6 SE corner
Can # 6L1534 Start PSI = 28 End PSI = 5.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.23	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.13	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.065	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.25	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	0.34	ug/m3	04
TO-15	1,4-Dichlorobenzene/TO-15	<0.20	ug/m3	ND, 04
TO-15	Benzene/TO-15	<0.26	ug/m3	ND, 04
TO-15	Carbon Tetrachloride/TO-15	0.50	ug/m3	04
TO-15	Chloroethane/TO-15	<0.22	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.16	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<1.7	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.13	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	12	ug/m3	04
TO-15	Freon 114/TO-15	<0.23	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	34	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.59	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	16	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.22	ug/m3	ND, 04
TO-15	Toluene/TO-15	20	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.65	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	<0.18	ug/m3	ND, 04
TO-15	Vinyl Chloride/TO-15	0.042	ug/m3	04

Sample: AD08998

Customer #: 173791

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:51:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-09 # 173791 Room 7 workshelf
Can # 6L1051 Start PSI = 30 End PSI = 6.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.22	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.13	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.064	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.25	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	0.40	ug/m3	04
TO-15	1,4-Dichlorobenzene/TO-15	<0.19	ug/m3	ND, 04
TO-15	Benzene/TO-15	0.48	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.45	ug/m3	04
TO-15	Chloroethane/TO-15	<0.21	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.16	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<1.7	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.13	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	14	ug/m3	04
TO-15	Freon 114/TO-15	<0.23	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	35	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.58	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	17	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.22	ug/m3	ND, 04
TO-15	Toluene/TO-15	28	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.64	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	<0.17	ug/m3	ND, 04
TO-15	Vinyl Chloride/TO-15	0.17	ug/m3	04

Sample: AD08999

Customer #: 173792

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:54:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-10 # 173792 Unisex bathroom
Can # 6L0465 Start PSI = 30 End PSI = 9.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.20	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.26	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.20	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.15	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.074	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.29	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.15	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.22	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	0.79	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.43	ug/m3	04
TO-15	Chloroethane/TO-15	<0.25	ug/m3	ND, 04
TO-15	Chloroform/TO-15	0.19	ug/m3	04
TO-15	Chloromethane/TO-15	<1.9	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.15	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	0.92	ug/m3	04
TO-15	Freon 114/TO-15	<0.26	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	1.9	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.67	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	0.88	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.25	ug/m3	ND, 04
TO-15	Toluene/TO-15	5.0	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.74	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	0.61	ug/m3	04
TO-15	Vinyl Chloride/TO-15	<0.048	ug/m3	ND, 04

Sample: AD09000

Customer #: 173793

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:55:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-11 # 173793 breakroom under TV
Can # 6L0864 Start PSI = 30 End PSI = 6.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.17	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.22	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.17	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.13	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.063	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.24	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.13	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.19	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	0.88	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.45	ug/m3	04
TO-15	Chloroethane/TO-15	<0.21	ug/m3	ND, 04
TO-15	Chloroform/TO-15	0.18	ug/m3	04
TO-15	Chloromethane/TO-15	<1.6	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.12	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	1.0	ug/m3	04
TO-15	Freon 114/TO-15	<0.22	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	ND, 04
TO-15	m,p-Xylene/TO-15	2.1	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.57	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	0.97	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.21	ug/m3	ND, 04
TO-15	Toluene/TO-15	5.9	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.63	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	0.57	ug/m3	04
TO-15	Vinyl Chloride/TO-15	<0.040	ug/m3	ND, 04

Sample: AD09001

Customer #: 173794

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:56:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: IA-12 # 173794 Front room filing cabinet
Can # 000001886 Start PSI = 30 End PSI = 9.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.20	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.25	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.20	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.15	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.072	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.28	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.15	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.22	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	1.8	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.38	ug/m3	04
TO-15	Chloroethane/TO-15	<0.24	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.18	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<1.9	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.14	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	0.98	ug/m3	04
TO-15	Freon 114/TO-15	<0.26	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	1.9	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.66	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	0.88	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.25	ug/m3	ND, 04
TO-15	Toluene/TO-15	5.6	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.72	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	0.53	ug/m3	04
TO-15	Vinyl Chloride/TO-15	<0.047	ug/m3	ND, 04

Sample: AD09002

Customer #: 173795

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 3:58:00 PM

Collector: KEN HANNON

Affiliation: ESP

Comments: Grab: AA-01 # 173795 Back of building
Can # 6L1341 Start PSI = 29.0 End PSI = 5.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.22	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.18	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.13	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.064	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.25	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.13	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.19	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	0.28	ug/m3	04
TO-15	Carbon Tetrachloride/TO-15	0.46	ug/m3	04
TO-15	Chloroethane/TO-15	<0.21	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.16	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<0.17	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.13	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	0.31	ug/m3	04
TO-15	Freon 114/TO-15	<0.22	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	0.92	ug/m3	04
TO-15	Methyl tert-butyl ether/TO-15	<0.58	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	0.39	ug/m3	04
TO-15	Tetrachloroethene/TO-15	<0.22	ug/m3	ND, 04
TO-15	Toluene/TO-15	1.1	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.64	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	<0.17	ug/m3	ND, 04
TO-15	Vinyl Chloride/TO-15	<0.041	ug/m3	ND, 04

Sample: AD09003 **Customer #:** 173796

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 4:18:00 PM **Collector:** KEN HANNON **Affiliation:** ESP

Comments: Grab: AA-02 # 173796 Front building in a tree
Can # 6L1263 Start PSI = 30.0 End PSI = 10.0

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
TO-15	1,1,1-Trichloroethane/TO-15	<0.21	ug/m3	ND, 04
TO-15	1,1,2,2-Tetrachloroethane/TO-15	<0.27	ug/m3	ND, 04
TO-15	1,1,2-Trichloroethane/TO-15	<0.21	ug/m3	ND, 04
TO-15	1,1-Dichloroethane/TO-15	<0.16	ug/m3	ND, 04
TO-15	1,1-Dichloroethene/TO-15	<0.078	ug/m3	ND, 04
TO-15	1,2-Dibromoethane (EDB)/TO-15	<0.30	ug/m3	ND, 04
TO-15	1,2-Dichloroethane/TO-15	<0.16	ug/m3	ND, 04
TO-15	1,4-Dichlorobenzene/TO-15	<0.24	ug/m3	ND, 04, 06
TO-15	Benzene/TO-15	<0.31	ug/m3	ND, 04
TO-15	Carbon Tetrachloride/TO-15	0.44	ug/m3	04
TO-15	Chloroethane/TO-15	<0.26	ug/m3	ND, 04
TO-15	Chloroform/TO-15	<0.19	ug/m3	ND, 04
TO-15	Chloromethane/TO-15	<2.0	ug/m3	ND, 04
TO-15	cis-1,2-Dichloroethene/TO-15	<0.16	ug/m3	ND, 04
TO-15	Ethylbenzene/TO-15	<0.17	ug/m3	ND, 04
TO-15	Freon 114/TO-15	<0.27	ug/m3	ND, 04
TO-15	Freon 12/TO-15	2.0	ug/m3	04
TO-15	m,p-Xylene/TO-15	<0.34	ug/m3	ND, 04
TO-15	Methyl tert-butyl ether/TO-15	<0.71	ug/m3	ND, 04
TO-15	Naphthalene/TO-15	Not Analyzed	ug/m3	
TO-15	o-Xylene/TO-15	<0.17	ug/m3	ND, 04
TO-15	Tetrachloroethene/TO-15	<0.26	ug/m3	ND, 04
TO-15	Toluene/TO-15	0.32	ug/m3	04
TO-15	trans-1,2-Dichloroethene/TO-15	<0.78	ug/m3	ND, 04
TO-15	Trichloroethene/TO-15	<0.21	ug/m3	ND, 04
TO-15	Vinyl Chloride/TO-15	<0.050	ug/m3	ND, 04

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.



Data Qualifier(s)

04	Analyzed by contract laboratory	06	Estimated value, QC data outside limits
ND	Not detected at reported value		

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003020

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08868

Customer #: 173797

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 7:53:00 AM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Comments: Grab: Sample #173797 is a trip blank.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND

Sample: AD08868 **Customer #:** 173797

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 7:53:00 AM **Collector:** CALEB TROUTT **Affiliation:** ESP/EER

Comments: Grab: Sample #173797 is a trip blank.

Project: SI

524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003021

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08869

Customer #: 173798

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 8:48:00 AM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: DW-13

Comments: Grab: Sample #173798 was taken from spigot. 697 Ballpark Road.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND

Sample: AD08869 **Customer #:** 173798

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 8:48:00 AM **Collector:** CALEB TROUTT **Affiliation:** ESP/EER

Sample Location: DW-13

Comments: Grab: Sample #173798 was taken from spigot. 697 Ballpark Road.

Project: SI

524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field Dissolved Oxygen	Field Dissolved Oxygen/SM 4500-O-G	5.49	mg/L	
Field pH	Field pH/EPA 150.1	6.96	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	586 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	15.3 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003022

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08870

Customer #: 173799

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 9:18:00 AM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: DW-14

Comments: Grab: Sample #173799 was taken from spigot on back of house at 10 Hyd-a-way.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND

Sample: AD08870

Customer #: 173799

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 9:18:00 AM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: DW-14

Comments: Grab: Sample #173799 was taken from spigot on back of house at 10 Hyd-a-way.

Project: SI

524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field Dissolved Oxygen	Field Dissolved Oxygen/SM 4500-O-G	6.55	mg/L	
Field pH	Field pH/EPA 150.1	7.1	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	639 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	19.1 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003023

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08871

Customer #: 173800

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 9:45:00 AM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: DW-15

Comments: Grab: Sample #173800 was taken from wellhouse at Belmont duplex.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND

Sample: AD08871 **Customer #:** 173800

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 9:45:00 AM **Collector:** CALEB TROUTT **Affiliation:** ESP/EER

Sample Location: DW-15

Comments: Grab: Sample #173800 was taken from wellhouse at Belmont duplex.

Project: SI

524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field Dissolved Oxygen	Field Dissolved Oxygen/SM 4500-O-G	4.76	mg/L	
Field pH	Field pH/EPA 150.1	7.17	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	527 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	17.5 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003016

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08864

Customer #: 173801

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 12:00:00 AM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Comments: Grab: Sample #173801 is a blind duplicate.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND

Sample: AD08864 **Customer #:** 173801

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 12:00:00 AM **Collector:** CALEB TROUTT **Affiliation:** ESP/EER

Comments: Grab: Sample #173801 is a blind duplicate.

Project: SI

524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003017

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08865

Customer #: 173802

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 10:25:00 AM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: DW-16

Comments: Grab: Sample #173802 was taken from spigot on side of well house at 1197 Ballpark Road.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND

Sample: AD08865 **Customer #:** 173802

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 10:25:00 AM **Collector:** CALEB TROUTT **Affiliation:** ESP/EER

Sample Location: DW-16

Comments: Grab: Sample #173802 was taken from spigot on side of well house at 1197 Ballpark Road.

Project: SI

524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field Dissolved Oxygen	Field Dissolved Oxygen/SM 4500-O-G	5.73	mg/L	
Field pH	Field pH/EPA 150.1	7.11	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	703 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	15.5 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003018

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08866

Customer #: 173803

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 10:53:00 AM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: DW-17

Comments: Grab: Sample #173803 was taken from spigot on front of house at 1207 Ballpark Road.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND

Sample: AD08866 **Customer #:** 173803

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 10:53:00 AM **Collector:** CALEB TROUTT **Affiliation:** ESP/EER

Sample Location: DW-17

Comments: Grab: Sample #173803 was taken from spigot on front of house at 1207 Ballpark Road.

Project: SI

524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field Dissolved Oxygen	Field Dissolved Oxygen/SM 4500-O-G	5.38	mg/L	
Field pH	Field pH/EPA 150.1	7.22	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	574 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	16.5 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003019

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08867

Customer #: 173804

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 11:40:00 AM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: DW-18

Comments: Grab: Sample #173804 was taken from spigot in garage at 139 Banner Street.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND

Sample: AD08867 **Customer #:** 173804

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 11:40:00 AM **Collector:** CALEB TROUTT **Affiliation:** ESP/EER

Sample Location: DW-18

Comments: Grab: Sample #173804 was taken from spigot in garage at 139 Banner Street.

Project: SI

524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field Dissolved Oxygen	Field Dissolved Oxygen/SM 4500-O-G	5.87	mg/L	
Field pH	Field pH/EPA 150.1	7.16	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	560 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	16.7 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003024

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08872

Customer #: 173805

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 2:05:00 PM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: SW-01

Comments: Grab: Sample #173805 was taken from unnamed spring near remains of old building.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	<0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	<0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	<0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	<0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	<0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	<0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	<0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	<1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	<0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	<0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	<0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	<0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	<0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	<0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	<0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	<0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	<0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	<0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	<0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	<0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	<0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	<0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	<0.5	µg/L	ND
524.2	Benzene/524.2	<0.5	µg/L	ND
524.2	Bromobenzene/524.2	<0.5	µg/L	ND
524.2	Bromochloromethane/524.2	<0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	<0.5	µg/L	ND
524.2	Bromoform/524.2	<0.5	µg/L	ND
524.2	Bromomethane/524.2	<2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	<0.5	µg/L	ND
524.2	Chlorobenzene/524.2	<0.5	µg/L	ND
524.2	Chloroethane/524.2	<5	µg/L	ND

Sample: AD08872

Customer #: 173805

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 2:05:00 PM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: SW-01

Comments: Grab: Sample #173805 was taken from unnamed spring near remains of old building.

Project: SI

524.2	Chloroform/524.2	<0.5	µg/L	ND
524.2	Chloromethane/524.2	<10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	<0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	<0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	<0.5	µg/L	ND
524.2	Dibromomethane/524.2	<0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	<1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	<0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	<1	µg/L	ND
524.2	Isopropylbenzene/524.2	<0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	<0.5	µg/L	ND
524.2	Methylene Chloride/524.2	<0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	<1	µg/L	ND
524.2	Naphthalene/524.2	<1	µg/L	ND
524.2	n-Butylbenzene/524.2	<0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	<0.5	µg/L	ND
524.2	o-Xylene/524.2	<0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	<0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	<0.5	µg/L	ND
524.2	Styrene/524.2	<0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	<0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	<0.5	µg/L	ND
524.2	Toluene/524.2	<0.5	µg/L	ND
524.2	Total Xylenes/524.2	<0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	<0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	<0.5	µg/L	ND
524.2	Trichloroethene/524.2	<0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	<0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	<0.5	µg/L	ND
Field Dissolved Oxygen	Field Dissolved Oxygen/SM 4500-O-G	5.84	mg/L	
Field pH	Field pH/EPA 150.1	7.23	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	642 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	18.0 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003025

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08873

Customer #: 173806

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 2:35:00 PM

Collector: CALEB TROUTT

Affiliation: ESP/EER

Sample Location: SW-02

Comments: Grab: Sample #173806 was taken from Cullen Spring.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	<0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	<0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	<0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	<0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	<0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	<0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	<0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	<1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	<0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	<0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	<0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	<0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	<0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	<0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	<0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	<0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	<0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	<0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	<0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	<0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	<0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	<0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	<0.5	µg/L	ND
524.2	Benzene/524.2	<0.5	µg/L	ND
524.2	Bromobenzene/524.2	<0.5	µg/L	ND
524.2	Bromochloromethane/524.2	<0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	<0.5	µg/L	ND
524.2	Bromoform/524.2	<0.5	µg/L	ND
524.2	Bromomethane/524.2	<2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	<0.5	µg/L	ND
524.2	Chlorobenzene/524.2	<0.5	µg/L	ND
524.2	Chloroethane/524.2	<5	µg/L	ND
524.2	Chloroform/524.2	<0.5	µg/L	ND

Sample: AD08873 **Customer #:** 173806

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 2:35:00 PM **Collector:** CALEB TROUTT **Affiliation:** ESP/EER

Sample Location: SW-02

Comments: Grab: Sample #173806 was taken from Cullen Spring.

Project: SI

524.2	Chloromethane/524.2	<10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	<0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	<0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	<0.5	µg/L	ND
524.2	Dibromomethane/524.2	<0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	<1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	<0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	<1	µg/L	ND
524.2	Isopropylbenzene/524.2	<0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	<0.5	µg/L	ND
524.2	Methylene Chloride/524.2	<0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	<1	µg/L	ND
524.2	Naphthalene/524.2	<1	µg/L	ND
524.2	n-Butylbenzene/524.2	<0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	<0.5	µg/L	ND
524.2	o-Xylene/524.2	<0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	<0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	<0.5	µg/L	ND
524.2	Styrene/524.2	<0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	<0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	<0.5	µg/L	ND
524.2	Toluene/524.2	<0.5	µg/L	ND
524.2	Total Xylenes/524.2	<0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	<0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	<0.5	µg/L	ND
524.2	Trichloroethene/524.2	<0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	<0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	<0.5	µg/L	ND
Field Dissolved Oxygen	Field Dissolved Oxygen/SM 4500-O-G	8.55	mg/L	
Field pH	Field pH/EPA 150.1	7.01	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	465.7 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	14.8 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003030

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08878

Customer #: 173807

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 7:52:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173807, Trip blank.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND

Sample: AD08878 **Customer #:** 173807

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 7:52:00 AM **Collector:** KEN HANNON **Affiliation:** ESP/EER

Comments: Grab: Sample 173807, Trip blank.

Project: SI

524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003026

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08874

Customer #: 173808

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 8:47:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173808, DW-01 at Loc. ID # 113. Front of barn at right side.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08874 **Customer #:** 173808

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 8:47:00 AM **Collector:** KEN HANNON **Affiliation:** ESP/EER

Comments: Grab: Sample 173808, DW-01 at Loc. ID # 113. Front of barn at right side.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	6.96	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	951 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	17.0 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003027

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08875

Customer #: 173809

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 9:13:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173809, DW-02 at Loc. ID # 111. Spigot prior to water softner.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08875 **Customer #:** 173809

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 9:13:00 AM **Collector:** KEN HANNON **Affiliation:** ESP/EER

Comments: Grab: Sample 173809, DW-02 at Loc. ID # 111. Spigot prior to water softner.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	6.92	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	799 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	17.5 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003028

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08876

Customer #: 173810

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 9:35:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173810, DW-03 at Loc. ID # 103. Spigot on back of house.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08876

Customer #: 173810

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 9:35:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173810, DW-03 at Loc. ID # 103. Spigot on back of house.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	7.05	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	739 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	18.9 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003029

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08877

Customer #: 173811

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 10:06:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173811, DW-04 at Loc. ID # 114. Spigot on front corner of the house.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08877 **Customer #:** 173811

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 10:06:00 AM **Collector:** KEN HANNON **Affiliation:** ESP/EER

Comments: Grab: Sample 173811, DW-04 at Loc. ID # 114. Spigot on front corner of the house.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	6.75	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	1388 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	17.2 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003031

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08879

Customer #: 173812

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 10:35:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173812, DW-05 at Loc. ID # 115. Spigot behind the house.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08879 **Customer #:** 173812

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 10:35:00 AM **Collector:** KEN HANNON **Affiliation:** ESP/EER

Comments: Grab: Sample 173812, DW-05 at Loc. ID # 115. Spigot behind the house.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	6.71	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	951 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	17.2 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003032

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08880

Customer #: 173813

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 10:50:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173813, DW-06 at Loc. ID # 117. Spigot on front of house.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08880

Customer #: 173813

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 10:50:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173813, DW-06 at Loc. ID # 117. Spigot on front of house.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	6.65	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	1014 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	19.0 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003033

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08881

Customer #: 173814

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 11:08:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173814, DW-07 at Loc. ID # 118. Spigot on the side of the house facing the road.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08881

Customer #: 173814

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 11:08:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173814, DW-07 at Loc. ID # 118. Spigot on the side of the house facing the road.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	6.77	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	814 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	17.7 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003034

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08882

Customer #: 173815

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 11:45:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173815, DW-08 at Loc. ID # 108. Spigot in well house.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08882

Customer #: 173815

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 11:45:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173815, DW-08 at Loc. ID # 108. Spigot in well house.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	7.03	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	657 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	16.9 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003035

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08883

Customer #: 173816

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 12:00:00 PM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173816, DW-09 at Loc. ID # 124. Spigot at wellhead.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08883 **Customer #:** 173816

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 12:00:00 PM **Collector:** KEN HANNON **Affiliation:** ESP/EER

Comments: Grab: Sample 173816, DW-09 at Loc. ID # 124. Spigot at wellhead.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	6.68	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	837 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	16.9 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources
Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003036

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08884

Customer #: 173817

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 1:27:00 PM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173817, DW-10 at Camdenton Public Well #4.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND

Sample: AD08884 **Customer #:** 173817

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 1:27:00 PM **Collector:** KEN HANNON **Affiliation:** ESP/EER

Comments: Grab: Sample 173817, DW-10 at Camdenton Public Well #4.

Project: SI

524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	7.13	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	659 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	17.7 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003037

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08885

Customer #: 173818

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 12:00:00 AM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173818. Blind Duplicate.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND
524.2	Chloromethane/524.2	< 10	µg/L	ND

Sample: AD08885 **Customer #:** 173818

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 12:00:00 AM **Collector:** KEN HANNON **Affiliation:** ESP/EER

Comments: Grab: Sample 173818. Blind Duplicate.

Project: SI

524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

Environmental Services Program
PO Box 176 Jefferson City MO 65102-0176

RESULTS OF SAMPLE ANALYSES

LDPR/Job Code: FEPA3/NJ18DAWS

Program, Contact: HWP Valerie Wilder

Order ID: 171003038

Valerie Wilder
Hazardous Waste Program

Report Date: 10/10/2017

Sample: AD08886

Customer #: 173819

Site: Dawson Metals Site

County: Camden

Collect Date: 10/2/2017 6:47:00 PM

Collector: KEN HANNON

Affiliation: ESP/EER

Comments: Grab: Sample 173819, DW-11 at Loc. ID # 116. Downstairs bathroom sink. Spigot nearest the wellhead.

Project: SI

Test	Parameter/Method	Result	Units	Qualifier(s)
524.2	1,1,1,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,1-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2,2-Tetrachloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1,2-Trichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	1,1-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	1,2,3-Trichlorobenzene/524.2	< 1	µg/L	ND
524.2	1,2,3-Trichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2,4-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromo-3-Chloropropane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dibromoethane (EDB)/524.2	< 0.1	µg/L	ND
524.2	1,2-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloroethane/524.2	< 0.5	µg/L	ND
524.2	1,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,3,5-Trimethylbenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	1,3-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	1,4-Dichlorobenzene/524.2	< 0.5	µg/L	ND
524.2	2,2-Dichloropropane/524.2	< 0.5	µg/L	ND
524.2	2-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	4-Chlorotoluene/524.2	< 0.5	µg/L	ND
524.2	Benzene/524.2	< 0.5	µg/L	ND
524.2	Bromobenzene/524.2	< 0.5	µg/L	ND
524.2	Bromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromodichloromethane/524.2	< 0.5	µg/L	ND
524.2	Bromoform/524.2	< 0.5	µg/L	ND
524.2	Bromomethane/524.2	< 2.5	µg/L	ND
524.2	Carbon Tetrachloride/524.2	< 0.5	µg/L	ND
524.2	Chlorobenzene/524.2	< 0.5	µg/L	ND
524.2	Chloroethane/524.2	< 5	µg/L	ND
524.2	Chloroform/524.2	< 0.5	µg/L	ND

Sample: AD08886 **Customer #:** 173819

Site: Dawson Metals Site **County:** Camden

Collect Date: 10/2/2017 6:47:00 PM **Collector:** KEN HANNON **Affiliation:** ESP/EER

Comments: Grab: Sample 173819, DW-11 at Loc. ID # 116. Downstairs bathroom sink. Spigot nearest the wellhead.

Project: SI

524.2	Chloromethane/524.2	< 10	µg/L	ND
524.2	cis-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	cis-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Dibromochloromethane/524.2	< 0.5	µg/L	ND
524.2	Dibromomethane/524.2	< 0.5	µg/L	ND
524.2	Dichlorodifluoromethane/524.2	< 1	µg/L	ND, 06
524.2	Ethylbenzene/524.2	< 0.5	µg/L	ND
524.2	Hexachlorobutadiene/524.2	< 1	µg/L	ND
524.2	Isopropylbenzene/524.2	< 0.5	µg/L	ND
524.2	m&p-Xylenes/524.2	< 0.5	µg/L	ND
524.2	Methylene Chloride/524.2	< 0.5	µg/L	ND
524.2	Methyl-t-butyl ether/524.2	< 1	µg/L	ND
524.2	Naphthalene/524.2	< 1	µg/L	ND
524.2	n-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	n-Propylbenzene/524.2	< 0.5	µg/L	ND
524.2	o-Xylene/524.2	< 0.5	µg/L	ND
524.2	p-Isopropyltoluene/524.2	< 0.5	µg/L	ND
524.2	sec-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Styrene/524.2	< 0.5	µg/L	ND
524.2	tert-Butylbenzene/524.2	< 0.5	µg/L	ND
524.2	Tetrachloroethene/524.2	< 0.5	µg/L	ND
524.2	Toluene/524.2	< 0.5	µg/L	ND
524.2	Total Xylenes/524.2	< 0.5	µg/L	ND
524.2	trans-1,2-Dichloroethene/524.2	< 0.5	µg/L	ND
524.2	trans-1,3-Dichloropropene/524.2	< 0.5	µg/L	ND
524.2	Trichloroethene/524.2	< 0.5	µg/L	ND
524.2	Trichlorofluoromethane/524.2	< 0.5	µg/L	ND
524.2	Vinyl Chloride/524.2	< 0.5	µg/L	ND
Field pH	Field pH/EPA 150.1	6.73	pH Units	
Field Specific Conductivity	Field Specific Conductivity/SM 2510	1432 uS/cm		
Field Temperature	Field Temperature/EPA 170.1	17.6 C		

The analysis of this sample was performed in accordance with procedures approved or recognized by the U. S. Environmental Protection Agency.

Data Qualifier(s)

06	Estimated value, QC data outside limits	ND	Not detected at reported value

Kevin Thoenen,
Laboratory Manager
Environmental Services Program
Division of Environmental Quality

VI. REFERENCES

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Eric R. Greitens, Governor
Carol S. Comer, Director

MEMORANDUM

DATE: September 8, 2017

TO: Amanda Branson, Environmental Specialist
Keith Brown, Environmental Specialist
Hazardous Waste Program,
Division of Environmental Quality (DEQ)

FROM: Peter Bachle, Geologist
Geological Survey Program,
Missouri Geological Survey (MGS)

STATE OF MISSOURI
BRENNA E McDONALD
REGISTERED GEOLOGIST

4 pages w/attachments

SUBJECT: Addendum Geohydrologic Summary of Camdenton TCE Sites

LOCATION: Camdenton, Camden County, Missouri
Approximately 37.9988° North Latitude and 92.7634° West Longitude
(Dawson Metal Products Facility #2)
Approximately 38.0115° North Latitude and 92.7547° West Longitude
(Hulett Lagoon)
Approximately 37.9696° North Latitude and 92.6867° West Longitude
(Camdenton Sludge Disposal)

This is an addendum to the March 1999 geohydrologic reports for the Camdenton Sludge Disposal and Hulett Lagoon sites in addition to the recently discovered Dawson Metal Products Facility #2 site. This report is prepared in order to aid in determining optimum sampling locations and identifying potential groundwater receptors for site originated contaminants.

The primary contaminants of concern at the sites are the chlorinated solvent trichloroethylene (TCE) and the daughter products of degradation. These compounds are dense non-aqueous phase liquids (DNAPLs) that sink through the water column with very slight dissolution in water. The free product will descend deep into the aquifer while the dissolved phase plume will migrate in the down gradient direction of groundwater flow, this being due to natural gradients and water well cones of depression.

RECEIVED
SEP 13 2017
Hazardous Waste Program
MO Dept of Natural Resources

Recycled paper

A secondary contaminant of concern is chromium. This contaminant is likely to bind with soil particles. Therefore, the extent of the chromium contamination may be limited to the unconsolidated materials at and near the disposal areas.

LOCATIONS

The three Camdenton TCE sites discussed within this document are as follows; the Dawson Metal Products Facility #2 (Dawson site) located on the north side of Highway 54 between Camdenton and the Lake of the Ozarks, the Hulett Lagoon and associated Modine site located on the west side of Camdenton, and the Camdenton Sludge Disposal site located approximately 3 miles southeast of Camdenton near the Camdenton Memorial Airport. The Dawson site is located on a ridge that has steep slopes descending to the northeast, north, and northwest. The Hulett Lagoon site is a dry lagoon located in the upper reaches of a valley that lies north of the Modine facility. The valley drains west toward the Lake of the Ozarks. The Camdenton Sludge Disposal site is located along a ridge at the southeast end of the Camdenton Memorial Airport.

GROUNDWATER PATHWAY

The Ordovician-age Gasconade Dolomite and Roubidoux Formation underlie the sites. These formations are part of the Ozark Aquifer. There are no known confining layers between the ground surface and the water table that would prevent migration of surface contaminants from reaching the aquifer at or near the location of the sites. In the case of all three locations, the bedrock has substantial secondary porosity development, or karst. The local classified losing stream segments, springs, caves, and 10- to 65-foot voids encountered in local wells attest to this.

According to drinking water well data, the water table within the Ozark Aquifer near the Dawson site lies close to the same elevation as the Lake of the Ozarks, that being between 660 to 675 feet above mean sea level (amsl). This puts the depth to groundwater for the Dawson site at 285 to 300 feet below ground surface (bgs). Based upon drinking water well data, the water table elevation beneath the Hulett Lagoon site lies somewhere between 700 and 865 feet amsl with 820 to 830 feet amsl being the most likely range near the lagoon. That places the depth to groundwater at the Hulett Lagoon site at 110 to 120 feet bgs. The elevation of groundwater near the Camdenton Sludge Disposal site lies between 765 and 790 feet amsl. That makes the depth to groundwater beneath the site range from 230 to 295 feet bgs. Since the primary site contaminants are chlorinated solvents, any wells that draw water from near the site are potential receptors. In the case of the Hulett Lagoon/Modine site, the dissolved TCE plume has been detected in the Mulberry Street public well which has a 400-foot-deep casing, a total depth of 900 feet, and lies between 740 to 1100 feet southeast of the potential source regions.

Since the bedrock in the area appears to have high karst development, the delineation of a contaminant plume may be complex. The contaminant plume may extend farther by entering cave streams, take preferential pathways and miss proximal wells, disperse laterally along more competent bedrock bedding planes, or get drawn toward high yield wells. Adding to the lateral complexity of the plume is the possible existence of domestic

wells at now-non-existent residences documented to be located at the south corner of the Dawson site property prior to 1968. Improperly abandoned wells can create preferential downward migration pathways.

Based upon static water level data from the Logmain and WIMS databases, there is a steep groundwater gradient toward the Lake of the Ozarks. Therefore, the dissolved phase of the chlorinated solvent plume most likely will migrate toward the lake. For all three site locations, the plume migration is, in general, toward the west and may impact springs that lie between the sites and the lake. In the case of the Dawson site, Cullen spring (elevation 700 feet amsl) and an unnamed spring (elevation 740 feet amsl) may be potential receptors.

The MGS drinking water well databases contain records of three municipal, one community public, one non-community public, and thirteen domestic wells within a ½-mile radius of the Camdenton TCE sites. On Table 1, Logmain well number 27877 and Public Water Supply Program well number 103793 are both associated the Camdenton municipal Blair Heights well.

Prior to 1987, registry of private wells was not required. Therefore, existing older wells may not be included in the database. Also, proper well registration may not have been submitted for some wells. Because of these exceptions, the databases may not accurately reflect all of the water usage in this area.

Figure 1 illustrates the recorded locations of the 18 known water wells within a ½-mile radius of the sites. Table 1 lists specific technical attributes (total and casing depth, static water level, date drilled, yield, etc.) of the water wells. In addition to well locations, Figure 1 illustrates the municipal water supply coverage area, county water supply district coverage area, regional groundwater elevation, classified gaining and losing stream segments, and known springs. All of these were used in determining groundwater depth, flow direction, and groundwater use for the sites.

SURFACE WATER PATHWAY

Surface water leaving the potential source area for the Dawson site flows north across the parking lot before descending the steep hill and entering a losing stream segment that drains toward the west. This stream changes to gaining near the lake level, meaning the surface water entering the ground along the losing length of the stream begins to discharge to the surface near the lake.

On August 23, 2017, Geological Survey Program (GSP) personnel were on-site at the Dawson site and observed that surface water had pooled along the southwest side of the building and was flowing into the steep valley located northwest of the building. It had been several days since the last rain fall, which indicates that the ground near the facility was saturated at the time of the site visit. It is not currently known how persistent, or whether there is, a perched water table beneath the site.

Surface water leaving the Hulett Lagoon site flows west down a steep hill, along a losing stream segment until it changes to gaining near the surface of the Lake of the Ozarks. The end of the losing segment downstream from the Hulett Lagoon site lies close to the end of the intermittent segment that is downstream of the Dawson site.

Surface water leaving the Camdenton Sludge Disposal site most likely flows to the northeast and/or southeast into classified losing stream segments. Water entering these streams will most likely enter the ground, thereby becoming groundwater, ultimately flowing west toward the lake.

RECOMMENDATIONS

Since the contaminant plume is not yet defined, it is recommended that drinking water wells located within 0.5 mile of the potential TCE disposal sites be sampled. Due to the sinking nature of the primary contaminant, surface casing may not be protective against TCE contamination. Since the recording of well data was sporadic prior to December 1986, a door-to-door well search is advisable. Due to the apparent groundwater gradient toward the Lake of the Ozarks, preferential sampling is advised to the west side of the sites. It is suggested that Cullen Spring and the unnamed spring located southwest and south of the Dawson site be sampled. If surface water still persists at the Dawson site, it is suggested that samples are taken from the valley near the northwest corner of the Dawson site building.

REFERENCES

Water Resource Program. (unpublished). *Well logs from Logmain database*. Missouri Department of Natural Resources-Directors Office.

Wellhead Protection Program. (unpublished). *Well information management system database (WIMS)*. Missouri Department of Natural Resources-Missouri Geological Survey.

Table 1: Well Data for the Camdenton TCE Sites

Water wells located within 0.5 mile of the Camdenton TCE sites.

0 to 0.5 Mile

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
Logmain	2506	330	--	980	--	1931	Domestic	Kelly	Ozark Aquifer	--
Logmain	2602	200	--	989	--	1932	Domestic	Michaux	Ozark Aquifer	--
Logmain	6264	97	--	930	--	1940	Domestic	Reed	Ozark Aquifer	--
Logmain	21330	335	63	979	175	1962	Domestic	Bevan	Ozark Aquifer	--
Logmain	27877	1060	400	1010	315	1974	Municipal	Camdenton Well #4 (Blair Hts)	Ozark Aquifer	300
Logmain	27880	848	--	1060	--	--	Community Public	Camden Co PWSD #2 Well #1	Ozark Aquifer	--
Logmain	28356	1100	435	1042	246	1980	Municipal	Camdenton Well #5	Ozark Aquifer	--
WIMS	52609	395	148	--	210	1991	Domestic	--	Ozark Aquifer	30
WIMS	68392	400	220	984	220	1991	Domestic	--	Ozark Aquifer	30
WIMS	84612	420	100	--	210	1992	Domestic	--	Ozark Aquifer	30
PDWP	103791	900	400	--	95	1986	Municipal	Camdenton (Mulberry)	Ozark Aquifer	600
PDWP	103793	1045	400	--	315	1974	Municipal	Camdenton (Blair Hts)	Ozark Aquifer	100
PDWP	105015	--	--	1060	--	--	Non-Community Public	Speedline Technologies Inc.	Ozark Aquifer	--
WIMS	189083	433	80	--	245	1997	Domestic	--	Ozark Aquifer	30
WIMS	255044	340	100	--	90	2000	Domestic	--	Ozark Aquifer	50
WIMS	271405	231	120	--	0	2000	Domestic	--	Ozark Aquifer	40
WIMS	288266	395	160	--	233	2003	Domestic	--	Ozark Aquifer	25
WIMS	296521	450	118	--	285	2004	Domestic	--	Ozark Aquifer	28
WIMS	368177	420	160	--	270	2006	Domestic	--	Ozark Aquifer	20

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Eric R. Greitens, Governor
Carol S. Comer, Director

MEMORANDUM



1 page w/ attachments
9/13/17

DATE: September 13, 2017

TO: Amanda Branson, Environmental Specialist,
Hazardous Waste Program,
Division of Environmental Quality (DEQ)

FROM: Peter Bachle, Geologist
Geological Survey Program,
Missouri Geological Survey (MGS)

SUBJECT: Four-Mile Well Survey for the Dawson Metal Products Facility #2 Site

LOCATION: SW ¼. SE ¼ Section 26, Township 38 North, Range 17 West, Hahatonka 7.5-Minute Quadrangle, Camden County, Missouri
Approximately 37.9988° North Latitude and 92.7634° West Longitude

FOUR-MILE WELL SURVEY

The Public Drinking Water Program (PDWP) public well, Wellhead Protection Section's Well Information Management System (WIMS), and the Logamin well log databases were assessed in order to determine the wells that are currently known to exist within 4 miles of the Dawson Metal Products Facility #2 site. Based upon the available information, there 510 known wells located within 4 miles of the site. There are records of six municipal, 29 community public, 18 non-community public, and 457 domestic wells within a 4-mile radius of the site. The nearest domestic drinking water well on record is located approximately 0.17 mile southeast of the site. The nearest public well on record is located approximately 0.25 mile northeast of the site.

Figure 2 illustrates the recorded locations of the 510 known water wells within a 4-mile radius of the site. Table 2 lists specific technical attributes (total and casing depth, static water level, date drilled, yield, etc.) of the water wells

Recycled paper

Table 2: Well Data for the Dawson Metal Products Facility #2 Site

Water wells located within 4 miles of the Dawson Metal Prodiucts Facility #2 site.

0 to 0.25 Mile

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	271405	231	120	--	0	2000	Domestic	--	Ozark Aquifer	40
PDWP	103793	1045	400	--	315	1974	Municipal	Camdenton (Blair Hts)	Ozark Aquifer	100

Wells found within 0 to 0.25 mile of the site: 2

0.25 to 0.5 Mile

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	288266	395	160	--	233	2003	Domestic	--	Ozark Aquifer	25
Logmain	2506	330	--	980	--	1931	Domestic	Kelly	Ozark Aquifer	--
Logmain	2602	200	--	989	--	1932	Domestic	Michaux	Ozark Aquifer	--
Logmain	6264	97	--	930	--	1940	Domestic	Reed	Ozark Aquifer	--

Wells found within 0.25 to 0.5 mile of the site: 4

0.5 to 1 Mile

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
PDWP	103791	900	400	--	95	1986	Municipal	Camdenton (Mulberry)	Ozark Aquifer	600
PDWP	105313	670	403	840	170	2005	Community Public	Forest Ridge Subdivision	Ozark Aquifer	120
WIMS	84612	420	100	--	210	1992	Domestic	--	Ozark Aquifer	30
WIMS	236448	290	150	--	--	1998	Domestic	--	Ozark Aquifer	30
WIMS	377632	325	81	--	180	2006	Domestic	--	Ozark Aquifer	25
WIMS	404040	360	100	--	245	2007	Domestic	--	Ozark Aquifer	35
WIMS	441798	305	103	--	120	2010	Domestic	--	Ozark Aquifer	25

Wells found within 0.5 to 1 mile of the site: 7

1 to 2 Miles

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
PDWP	101379	200	--	--	--	1963	Non-community Public	Old Kinderhook Resort & Marina	Ozark Aquifer	--
PDWP	101380	--	--	--	--	--	Non-community Public	Tonka Villa Resort	Ozark Aquifer	--
PDWP	101383	300	150	--	--	1984	Community Public	Lake Valley Condo	Ozark Aquifer	--
PDWP	101387	140	20	--	20	1973	Non-community Public	Rippling Waters Resort	Ozark Aquifer	25
PDWP	101967	350	80	--	63	1978	Non-community Public	Adam's Ale Resort, Inc.	Ozark Aquifer	--
PDWP	102042	300	147	--	--	1984	Community Public	Lake Valley Condo	Ozark Aquifer	--
PDWP	102043	340	147	--	--	1985	Community Public	Lake Valley Condo	Ozark Aquifer	--
PDWP	102044	340	147	--	--	1985	Community Public	Lake Valley Condo	Ozark Aquifer	--
PDWP	102085	150	20	--	30	1982	Non-community Public	Rippling Waters Resort	Ozark Aquifer	25
PDWP	102664	425	410	--	110	1991	Community Public	Minnowbrook Estates	Ozark Aquifer	97
PDWP	102870	--	--	--	--	--	Community Public	Cedar Glen Condo	Ozark Aquifer	--
PDWP	103491	590	425	--	--	1999	Non-community Public	St. Anthony's Catholic Church	Ozark Aquifer	--
PDWP	103792	940	450	--	254	1961	Municipal	Camdenton	Ozark Aquifer	380

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
PDWP	103930	--	--	--	--	--	Community Public	Grand View Condo	Ozark Aquifer	--
PDWP	103931	610	400	690	90	2004	Non-community Public	Cedar Green Land Acquisition LLC	Ozark Aquifer	--
PDWP	103980	--	--	--	--	--	Non-community Public	Lake Dental Clinic	Ozark Aquifer	--
PDWP	103985	--	350	--	--	--	Non-community Public	Ha Ha Tonka State Park	Ozark Aquifer	--
PDWP	104077	1100	463	--	260	1998	Municipal	Camdenton	Ozark Aquifer	550
PDWP	104078	610	278	1023	365	2000	Non-community Public	Der Essen Platz	Ozark Aquifer	30
PDWP	105149	445	280	--	60	2003	Community Public	Camden Co. PWSD #5 - Cedar Hts HOA	Ozark Aquifer	100
PDWP	105277	--	--	--	--	--	Community Public	Niangua Point Water Assoc	Ozark Aquifer	--
PDWP	105306	680	470	--	190	2005	Community Public	Niangua Highlands Estates	Ozark Aquifer	150
PDWP	105365	615	306	720	80	2007	Community Public	Hyd-A-Way Condo	Ozark Aquifer	180
PDWP	105584	735	420	890	140	2007	Community Public	Arbor Glen Townhomes	Ozark Aquifer	--
PDWP	105928	--	--	--	--	--	Community Public	Green Acres MHP	Ozark Aquifer	--
PDWP	106319	--	--	--	--	--	Community Public	J Bar H Estates	Ozark Aquifer	--
PDWP	106605	1500	425	1025	285	2011	Community Public	Camdenton	Ozark Aquifer	500
WIMS	2067	360	126	--	220	1987	Domestic	--	Ozark Aquifer	30
WIMS	2249	420	147	--	215	1987	Domestic	--	Ozark Aquifer	30
WIMS	4060	400	105	--	200	1987	Domestic	--	Ozark Aquifer	30
WIMS	5182	198	84	685	38	1987	Domestic	--	Ozark Aquifer	20
WIMS	5184	175	170	--	15	1987	Domestic	--	Ozark Aquifer	40
WIMS	5951	340	105	--	145	1987	Domestic	--	Ozark Aquifer	30
WIMS	6144	--	--	--	--	1988	Domestic	--	Ozark Aquifer	--
WIMS	7306	530	210	--	65	1988	Domestic	--	Ozark Aquifer	75
WIMS	11103	--	--	--	--	1988	Domestic	--	Ozark Aquifer	--
WIMS	24532	380	220	787	165	2005	Domestic	--	Ozark Aquifer	30
WIMS	24552	260	120	--	30	2005	Domestic	--	Ozark Aquifer	30
WIMS	26787	343	105	--	60	1989	Domestic	--	Ozark Aquifer	35
WIMS	33740	158	90	660	10	1989	Domestic	--	Ozark Aquifer	20
WIMS	33796	218	--	--	--	1990	Domestic	--	Ozark Aquifer	--
WIMS	34711	260	105	669	20	1990	Domestic	--	Ozark Aquifer	25
WIMS	34716	240	105	669	8	1990	Domestic	--	Ozark Aquifer	--
WIMS	43289	100	--	--	--	--	Domestic	--	Ozark Aquifer	--
WIMS	46891	498	122	--	325	1993	Domestic	--	Ozark Aquifer	18
WIMS	47249	200	--	--	--	1990	Domestic	--	Ozark Aquifer	--
WIMS	52590	250	175	708	60	1990	Domestic	--	Ozark Aquifer	55
WIMS	52595	151	80	669	10	1990	Domestic	--	Ozark Aquifer	25
WIMS	52626	231	110	710	65	1993	Domestic	--	Ozark Aquifer	25
WIMS	52628	210	120	--	35	1992	Domestic	--	Ozark Aquifer	30
WIMS	52656	210	100	--	35	1992	Domestic	--	Ozark Aquifer	20
WIMS	54310	240	120	660	35	1990	Domestic	--	Ozark Aquifer	30
WIMS	54311	220	119	720	30	1990	Domestic	--	Ozark Aquifer	30
WIMS	54495	407	105	--	--	1990	Domestic	--	Ozark Aquifer	--
WIMS	57439	468	190	--	240	1990	Domestic	--	Ozark Aquifer	25
WIMS	59221	215	106	690	22	1990	Domestic	--	Ozark Aquifer	25
WIMS	62723	380	102	--	265	1991	Domestic	--	Ozark Aquifer	30

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	62770	175	107	689	22	1991	Domestic	--	Ozark Aquifer	30
WIMS	64821	475	153	730	78	1994	Domestic	--	Ozark Aquifer	25
WIMS	66010	260	121	--	12	1992	Domestic	--	Ozark Aquifer	30
WIMS	68392	400	220	984	220	1991	Domestic	--	Ozark Aquifer	30
WIMS	68405	198	100	680	15	1991	Domestic	--	Ozark Aquifer	20
WIMS	77771	200	140	660	23	1992	Domestic	--	Ozark Aquifer	25
WIMS	91365	195	140	689	42	1993	Domestic	--	Ozark Aquifer	30
WIMS	91425	200	140	698	18	1993	Domestic	--	Ozark Aquifer	20
WIMS	96827	178	14	--	23	1993	Domestic	--	Ozark Aquifer	15
WIMS	96841	340	220	787	125	1994	Domestic	--	Ozark Aquifer	40
WIMS	120553	520	250	--	350	1994	Domestic	--	Ozark Aquifer	25
WIMS	120852	235	174	--	80	1994	Domestic	--	Ozark Aquifer	25
WIMS	120854	210	100	770	20	1995	Domestic	--	Ozark Aquifer	25
WIMS	120868	293	110	--	140	1994	Domestic	--	Ozark Aquifer	25
WIMS	133989	--	--	--	--	1996	Domestic	--	Ozark Aquifer	--
WIMS	133995	--	--	718	--	1999	Domestic	--	Ozark Aquifer	--
WIMS	138060	380	80	970	240	1996	Domestic	--	Ozark Aquifer	20
WIMS	154628	198	100	--	15	1996	Domestic	--	Ozark Aquifer	20
WIMS	158044	340	102	--	140	1996	Domestic	--	Ozark Aquifer	20
WIMS	158050	160	102	669	20	1996	Domestic	--	Ozark Aquifer	20
WIMS	173794	220	143	--	30	1992	Domestic	--	Ozark Aquifer	35
WIMS	181046	180	82	679	7	1997	Domestic	--	Ozark Aquifer	25
WIMS	181053	240	102	669	10	1998	Domestic	--	Ozark Aquifer	30
WIMS	186114	320	142	--	20	1997	Domestic	--	Ozark Aquifer	65
WIMS	190879	230	160	--	20	1997	Domestic	--	Ozark Aquifer	--
WIMS	209923	200	100	680	14	1998	Domestic	--	Ozark Aquifer	35
WIMS	209950	480	100	886	305	1999	Domestic	--	Ozark Aquifer	25
WIMS	214491	210	110	--	25	1999	Domestic	--	Ozark Aquifer	25
WIMS	221501	380	100	820	135	1999	Domestic	--	Ozark Aquifer	35
WIMS	226765	200	140	660	8	1999	Domestic	--	Ozark Aquifer	35
WIMS	226767	240	120	660	5	1999	Domestic	--	Ozark Aquifer	30
WIMS	226929	160	100	680	14	2000	Domestic	--	Ozark Aquifer	30
WIMS	236461	210	120	--	20	1998	Domestic	--	Ozark Aquifer	30
WIMS	237699	240	120	669	40	1999	Domestic	--	Ozark Aquifer	25
WIMS	255978	355	100	--	195	1997	Domestic	--	Ozark Aquifer	20
WIMS	263702	260	--	730	--	2001	Domestic	--	Ozark Aquifer	--
WIMS	272244	200	80	--	20	2001	Domestic	--	Ozark Aquifer	50
WIMS	272255	280	80	900	140	2001	Domestic	--	Ozark Aquifer	35
WIMS	274477	320	100	787	105	2003	Domestic	--	Ozark Aquifer	20
WIMS	278445	495	100	--	320	2002	Domestic	--	Ozark Aquifer	20
WIMS	278464	250	--	689	--	2001	Domestic	--	Ozark Aquifer	--
WIMS	282983	340	80	--	180	2001	Domestic	--	Ozark Aquifer	25
WIMS	282986	320	80	--	192	2002	Domestic	--	Ozark Aquifer	25
WIMS	282996	400	80	900	172	2001	Domestic	--	Ozark Aquifer	50

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	291162	--	--	--	--	2005	Domestic	--	Ozark Aquifer	--
WIMS	291169	--	--	--	20	2006	Domestic	--	Ozark Aquifer	--
WIMS	292668	--	--	--	40	2015	Domestic	--	Ozark Aquifer	--
WIMS	296528	230	129	--	90	2003	Domestic	--	Ozark Aquifer	50
WIMS	304227	--	--	--	10	2007	Domestic	--	Ozark Aquifer	--
WIMS	304229	--	--	--	25	2007	Domestic	--	Ozark Aquifer	--
WIMS	309084	370	84	826	156	2003	Domestic	--	Ozark Aquifer	35
WIMS	321096	230	100	--	15	2003	Domestic	--	Ozark Aquifer	40
WIMS	321250	210	80	--	25	2004	Domestic	--	Ozark Aquifer	35
WIMS	321656	340	120	900	179	2003	Domestic	--	Ozark Aquifer	30
WIMS	321663	220	100	660	6	2003	Domestic	--	Ozark Aquifer	30
WIMS	321704	360	100	984	185	2003	Domestic	--	Ozark Aquifer	18
WIMS	322920	190	120	--	35	2003	Domestic	--	Ozark Aquifer	35
WIMS	322921	210	120	--	20	2003	Domestic	--	Ozark Aquifer	35
WIMS	326986	150	80	--	15	2003	Domestic	--	Ozark Aquifer	30
WIMS	330307	285	81	880	160	2004	Domestic	--	Ozark Aquifer	35
WIMS	335216	210	100	--	25	2004	Domestic	--	Ozark Aquifer	25
WIMS	338696	520	80	--	280	2004	Domestic	--	Ozark Aquifer	35
WIMS	349614	140	120	--	15	2005	Domestic	--	Ozark Aquifer	40
WIMS	355282	500	80	--	267	2005	Domestic	--	Ozark Aquifer	35
WIMS	356284	280	140	--	32	2006	Domestic	--	Ozark Aquifer	60
WIMS	366951	190	100	--	20	2006	Domestic	--	Ozark Aquifer	25
WIMS	368143	200	120	--	6	2006	Domestic	--	Ozark Aquifer	60
WIMS	376955	205	101	--	60	2007	Domestic	--	Ozark Aquifer	25
WIMS	403194	240	120	--	10	2007	Domestic	--	Ozark Aquifer	25
WIMS	404037	170	100	--	6	2007	Domestic	--	Ozark Aquifer	30
WIMS	404038	260	200	--	80	2007	Domestic	--	Ozark Aquifer	40
WIMS	404104	200	100	--	10	2008	Domestic	--	Ozark Aquifer	20
WIMS	418269	235	95	--	25	2008	Domestic	--	Ozark Aquifer	30
WIMS	420935	247	141	--	30	2009	Domestic	--	Ozark Aquifer	40
WIMS	433594	220	121	--	4	2008	Domestic	--	Ozark Aquifer	20
WIMS	441823	300	80	--	20	2010	Domestic	--	Ozark Aquifer	30
WIMS	441850	250	80	--	20	2009	Domestic	--	Ozark Aquifer	25
WIMS	441901	285	150	--	80	2010	Domestic	--	Ozark Aquifer	35
WIMS	441935	365	82	--	250	2010	Domestic	--	Ozark Aquifer	35
WIMS	459948	405	83	--	120	2012	Domestic	--	Ozark Aquifer	30
WIMS	468206	195	95	--	25	2012	Domestic	--	Ozark Aquifer	35
WIMS	477124	255	95	--	30	2013	Domestic	--	Ozark Aquifer	30
WIMS	491166	305	103	--	25	2014	Domestic	--	Ozark Aquifer	40
Logmain	7789	494	--	1026	--	1942	Domestic	Dunn	Ozark Aquifer	--
Logmain	21330	335	--	979	175	1962	Domestic	Bevan	Ozark Aquifer	--

Wells found within 1 to 2 miles of the site: 142

2 to 3 Miles

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
PDWP	101384	550	250	--	75	1967	Non-community Public	Lake Valley Country Club	Ozark Aquifer	90
PDWP	102556	615	315	--	204	1997	Community Public	Old Kinderhook Community	Ozark Aquifer	120
PDWP	102557	700	300	--	60	1997	Community Public	Old Kinderhook Community	Ozark Aquifer	--
PDWP	103790	600	400	--	165	1969	Community Public	Windsor Estates Nursing Home	Ozark Aquifer	--
PDWP	103794	550	350	--	175	1970	Community Public	Southway Terrace MHP	Ozark Aquifer	--
PDWP	103929	--	--	--	--	1949	Non-community Public	Bridal Cave	Ozark Aquifer	100
PDWP	105190	800	400	--	--	--	Community Public	Villas of Shadow Crest	Ozark Aquifer	--
PDWP	105191	--	--	--	--	--	Community Public	Watkins Subdivision	Ozark Aquifer	--
PDWP	105450	--	--	--	--	--	Community Public	Hickory Village	Ozark Aquifer	--
PDWP	105575	--	--	--	--	--	Non-community Public	Van Hook Bait & Tackle	Ozark Aquifer	--
PDWP	106507	--	--	--	--	--	Community Public	Woodbridge Subdivision	Ozark Aquifer	--
WIMS	624	138	82	--	50	1987	Domestic	--	Ozark Aquifer	25
WIMS	1307	138	103	--	15	1987	Domestic	--	Ozark Aquifer	20
WIMS	1841	380	305	--	225	1987	Domestic	--	Ozark Aquifer	30
WIMS	2012	260	84	--	90	1987	Domestic	--	Ozark Aquifer	20
WIMS	5180	282	84	--	120	1987	Domestic	--	Ozark Aquifer	20
WIMS	5246	195	105	--	30	1988	Domestic	--	Ozark Aquifer	30
WIMS	5948	217	88	--	--	1987	Domestic	--	Ozark Aquifer	30
WIMS	5999	178	105	--	25	1987	Domestic	--	Ozark Aquifer	20
WIMS	6000	218	147	--	60	1987	Domestic	--	Ozark Aquifer	25
WIMS	8724	477	87	--	260	1988	Domestic	--	Ozark Aquifer	22
WIMS	9625	240	110	--	30	1988	Domestic	--	Ozark Aquifer	18
WIMS	11741	260	84	--	90	1987	Domestic	--	Ozark Aquifer	20
WIMS	12040	385	83	--	200	1988	Domestic	--	Ozark Aquifer	37
WIMS	12651	178	105	680	20	1989	Domestic	--	Ozark Aquifer	20
WIMS	14191	725	235	1045	370	1987	Domestic	--	Ozark Aquifer	35
WIMS	15206	343	103	--	140	1989	Domestic	--	Ozark Aquifer	25
WIMS	15367	170	108	--	--	1989	Domestic	--	Ozark Aquifer	30
WIMS	15368	210	87	--	30	1989	Domestic	--	Ozark Aquifer	12
WIMS	16656	467	166	--	280	1989	Domestic	--	Ozark Aquifer	20
WIMS	18989	240	120	669	20	1996	Domestic	--	Ozark Aquifer	30
WIMS	24547	380	180	--	189	2005	Domestic	--	Ozark Aquifer	60
WIMS	24573	220	120	689	21	2005	Domestic	--	Ozark Aquifer	30
WIMS	26793	198	190	720	--	1990	Domestic	--	Ozark Aquifer	60
WIMS	35881	210	100	820	90	1991	Domestic	--	Ozark Aquifer	25
WIMS	43849	178	--	680	--	1990	Domestic	--	Ozark Aquifer	--
WIMS	44398	410	80	--	250	1989	Domestic	--	Ozark Aquifer	25
WIMS	44602	380	139	--	205	1989	Domestic	--	Ozark Aquifer	25
WIMS	44623	200	126	690	43	1989	Domestic	--	Ozark Aquifer	20
WIMS	44635	220	126	670	62	1989	Domestic	--	Ozark Aquifer	30
WIMS	46869	353	106	--	245	1990	Domestic	--	Ozark Aquifer	15
WIMS	46879	233	140	689	40	1991	Domestic	--	Ozark Aquifer	40
WIMS	47228	235	140	728	45	1990	Domestic	--	Ozark Aquifer	30
WIMS	47246	191	130	708	28	1990	Domestic	--	Ozark Aquifer	50

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	52650	291	80	--	140	1992	Domestic	--	Ozark Aquifer	25
WIMS	54516	407	168	--	220	1990	Domestic	--	Ozark Aquifer	40
WIMS	57058	210	100	--	55	1994	Domestic	--	Ozark Aquifer	30
WIMS	58354	360	126	--	205	1990	Domestic	--	Ozark Aquifer	20
WIMS	62755	178	--	720	--	1991	Domestic	--	Ozark Aquifer	--
WIMS	66002	260	182	--	90	1992	Domestic	--	Ozark Aquifer	25
WIMS	68399	200	100	669	18	1991	Domestic	--	Ozark Aquifer	20
WIMS	77405	375	80	940	240	1993	Domestic	--	Ozark Aquifer	25
WIMS	88177	210	82	--	90	1992	Domestic	--	Ozark Aquifer	25
WIMS	91288	170	103	660	--	1993	Domestic	--	Ozark Aquifer	50
WIMS	91289	250	103	--	23	1993	Domestic	--	Ozark Aquifer	20
WIMS	91290	170	103	--	--	1993	Domestic	--	Ozark Aquifer	30
WIMS	96836	240	160	680	50	1994	Domestic	--	Ozark Aquifer	30
WIMS	104355	--	--	--	--	1994	Domestic	--	Ozark Aquifer	--
WIMS	108317	460	106	984	305	1994	Domestic	--	Ozark Aquifer	20
WIMS	108321	300	100	900	70	1994	Domestic	--	Ozark Aquifer	25
WIMS	108324	460	100	836	260	1994	Domestic	--	Ozark Aquifer	15
WIMS	108332	280	100	--	102	1994	Domestic	--	Ozark Aquifer	20
WIMS	108341	260	160	722	30	1995	Domestic	--	Ozark Aquifer	18
WIMS	120258	200	104	720	35	1994	Domestic	--	Ozark Aquifer	25
WIMS	120260	180	120	--	15	--	Domestic	--	Ozark Aquifer	20
WIMS	120261	320	82	--	160	1994	Domestic	--	Ozark Aquifer	25
WIMS	120573	300	120	760	100	1994	Domestic	--	Ozark Aquifer	30
WIMS	120860	352	80	--	170	1994	Domestic	--	Ozark Aquifer	20
WIMS	138033	250	165	698	95	1995	Domestic	--	Ozark Aquifer	25
WIMS	138034	210	143	--	35	1995	Domestic	--	Ozark Aquifer	30
WIMS	157532	460	100	--	240	1996	Domestic	--	Ozark Aquifer	20
WIMS	157738	310	220	240	100	1997	Domestic	--	Ozark Aquifer	25
WIMS	173813	260	110	--	35	1997	Domestic	--	Ozark Aquifer	30
WIMS	181029	240	102	669	25	1997	Domestic	--	Ozark Aquifer	40
WIMS	182558	340	100	--	120	1997	Domestic	--	Ozark Aquifer	15
WIMS	185530	360	100	850	195	1997	Domestic	--	Ozark Aquifer	20
WIMS	186131	260	104	--	--	1998	Domestic	--	Ozark Aquifer	30
WIMS	189074	415	100	--	195	1997	Domestic	--	Ozark Aquifer	35
WIMS	190850	280	82	--	95	1998	Domestic	--	Ozark Aquifer	60
WIMS	192241	360	80	--	200	1998	Domestic	--	Ozark Aquifer	--
WIMS	209888	280	100	--	150	2000	Domestic	--	Ozark Aquifer	25
WIMS	209926	220	80	--	95	1998	Domestic	--	Ozark Aquifer	25
WIMS	210520	300	100	760	160	1998	Domestic	--	Ozark Aquifer	25
WIMS	213427	241	80	760	120	1999	Domestic	--	Ozark Aquifer	30
WIMS	213432	200	100	--	15	1999	Domestic	--	Ozark Aquifer	25
WIMS	213437	609	122	--	400	1999	Domestic	--	Ozark Aquifer	20
WIMS	214479	245	160	--	55	1999	Domestic	--	Ozark Aquifer	35
WIMS	214495	270	80	--	135	1999	Domestic	--	Ozark Aquifer	20

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	221966	400	120	1080	--	2000	Domestic	--	Ozark Aquifer	35
WIMS	226003	210	101	700	30	1999	Domestic	--	Ozark Aquifer	30
WIMS	246744	--	--	--	--	2003	Domestic	--	Ozark Aquifer	--
WIMS	252739	380	242	1000	230	2000	Domestic	--	Ozark Aquifer	30
WIMS	252752	375	169	964	172	2000	Domestic	--	Ozark Aquifer	40
WIMS	252914	440	180	1020	250	2002	Domestic	--	Ozark Aquifer	28
WIMS	252917	180	100	660	1	2002	Domestic	--	Ozark Aquifer	20
WIMS	253285	360	180	760	112	2001	Domestic	--	Ozark Aquifer	30
WIMS	255042	320	80	807	120	2000	Domestic	--	Ozark Aquifer	30
WIMS	255043	220	120	--	23	2001	Domestic	--	Ozark Aquifer	35
WIMS	263077	333	180	--	190	2001	Domestic	--	Ozark Aquifer	25
WIMS	263747	260	120	689	40	2000	Domestic	--	Ozark Aquifer	30
WIMS	272185	240	110	680	40	2001	Domestic	--	Ozark Aquifer	25
WIMS	272250	300	100	--	120	2001	Domestic	--	Ozark Aquifer	35
WIMS	274428	300	140	820	96	2002	Domestic	--	Ozark Aquifer	30
WIMS	274453	400	240	780	115	2002	Domestic	--	Ozark Aquifer	30
WIMS	274529	480	291	984	240	2001	Domestic	--	Ozark Aquifer	30
WIMS	278455	270	119	--	70	2002	Domestic	--	Ozark Aquifer	25
WIMS	278472	310	80	--	110	2001	Domestic	--	Ozark Aquifer	20
WIMS	278488	230	80	--	45	2001	Domestic	--	Ozark Aquifer	25
WIMS	287057	268	121	690	--	2002	Domestic	--	Ozark Aquifer	30
WIMS	288267	270	106	--	145	2003	Domestic	--	Ozark Aquifer	25
WIMS	293085	445	80	--	273	2006	Domestic	--	Ozark Aquifer	35
WIMS	293093	220	120	689	22	2002	Domestic	--	Ozark Aquifer	40
WIMS	309067	220	120	689	28	2003	Domestic	--	Ozark Aquifer	35
WIMS	310108	400	178	708	97	2005	Domestic	--	Ozark Aquifer	30
WIMS	321160	310	120	--	109	2003	Domestic	--	Ozark Aquifer	25
WIMS	321673	300	120	866	118	2003	Domestic	--	Ozark Aquifer	30
WIMS	321676	320	140	700	41	2003	Domestic	--	Ozark Aquifer	60
WIMS	321677	300	140	720	40	2003	Domestic	--	Ozark Aquifer	40
WIMS	326619	190	80	--	55	2003	Domestic	--	Ozark Aquifer	20
WIMS	326981	220	80	--	15	2003	Domestic	--	Ozark Aquifer	30
WIMS	327006	250	80	--	20	2003	Domestic	--	Ozark Aquifer	35
WIMS	329346	267	121	689	50	2004	Domestic	--	Ozark Aquifer	30
WIMS	330305	305	81	--	140	2005	Domestic	--	Ozark Aquifer	35
WIMS	332763	460	140	920	200	2004	Domestic	--	Ozark Aquifer	40
WIMS	334132	207	101	748	30	2004	Domestic	--	Ozark Aquifer	30
WIMS	334432	210	100	--	35	2004	Domestic	--	Ozark Aquifer	35
WIMS	334826	405	81	--	240	2005	Domestic	--	Ozark Aquifer	25
WIMS	347066	290	80	--	150	2005	Domestic	--	Ozark Aquifer	35
WIMS	347071	220	147	--	30	2005	Domestic	--	Ozark Aquifer	30
WIMS	355277	340	160	--	49	2005	Domestic	--	Ozark Aquifer	40
WIMS	356018	225	121	689	35	2005	Domestic	--	Ozark Aquifer	45
WIMS	365704	300	120	--	30	2005	Domestic	--	Ozark Aquifer	50

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	368146	260	140	--	42	2006	Domestic	--	Ozark Aquifer	30
WIMS	368188	440	140	--	242	2006	Domestic	--	Ozark Aquifer	40
WIMS	369209	287	121	--	20	2006	Domestic	--	Ozark Aquifer	30
WIMS	375750	446	81	--	300	2005	Domestic	--	Ozark Aquifer	25
WIMS	380184	250	175	--	80	2007	Domestic	--	Ozark Aquifer	30
WIMS	380365	267	121	--	30	2007	Domestic	--	Ozark Aquifer	30
WIMS	403183	200	120	--	2	2007	Domestic	--	Ozark Aquifer	40
WIMS	403192	260	120	--	25	2007	Domestic	--	Ozark Aquifer	40
WIMS	404535	245	82	--	100	2007	Domestic	--	Ozark Aquifer	30
WIMS	417132	405	102	--	160	2007	Domestic	--	Ozark Aquifer	65
WIMS	418021	205	83	--	30	2008	Domestic	--	Ozark Aquifer	30
WIMS	432810	460	180	--	280	2009	Domestic	--	Ozark Aquifer	25
WIMS	433912	260	80	--	12	2008	Domestic	--	Ozark Aquifer	25
WIMS	433913	250	80	--	40	2008	Domestic	--	Ozark Aquifer	35
WIMS	441786	225	122	--	25	2009	Domestic	--	Ozark Aquifer	30
WIMS	441827	330	105	--	180	2010	Domestic	--	Ozark Aquifer	25
WIMS	441831	250	80	--	60	2010	Domestic	--	Ozark Aquifer	25
WIMS	441902	245	122	--	30	2010	Domestic	--	Ozark Aquifer	25
WIMS	459876	505	180	--	180	2011	Domestic	--	Ozark Aquifer	45
WIMS	459912	245	83	--	80	2012	Domestic	--	Ozark Aquifer	20
WIMS	477146	395	255	--	170	2013	Domestic	--	Ozark Aquifer	30
WIMS	479322	260	140	--	28	2014	Domestic	--	Ozark Aquifer	25
WIMS	491172	525	143	--	40	2014	Domestic	--	Ozark Aquifer	120
WIMS	492197	380	120	--	180	2015	Domestic	--	Ozark Aquifer	25
WIMS	492498	405	247	--	140	2015	Domestic	--	Ozark Aquifer	35
WIMS	496237	590	82	898	130	2015	Domestic	--	Ozark Aquifer	40
WIMS	505503	227	81	--	45	2015	Domestic	--	Ozark Aquifer	--
WIMS	513954	480	220	--	134	2016	Domestic	--	Ozark Aquifer	40
WIMS	514203	406	140	--	230	2016	Domestic	--	Ozark Aquifer	30
Logmain	2649	367	--	1065	--	1932	Domestic	Collins	Ozark Aquifer	--
Logmain	6568	70	--	671	--	1940	Domestic	Scott,	Ozark Aquifer	--
Logmain	13619	105	--	996	--	1955	Domestic	Scott	Ozark Aquifer	--
Logmain	14093	570	--	990	195	1955	Domestic	Scott	Ozark Aquifer	--
Logmain	19602	376	--	840	155	1961	Domestic	Huber	Ozark Aquifer	--

Wells found within 2 to 3 miles of the site: 166

3 to 4 Miles

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
PDWP	102242	--	86	--	--	--	Non-community Public	New Tribes Mission Inc	Ozark Aquifer	--
PDWP	102243	--	--	--	--	--	Non-community Public	New Tribes Mission Inc	Ozark Aquifer	--
PDWP	103002	300	150	--	20	1984	Non-community Public	Clearwater Resort	Ozark Aquifer	30
PDWP	103003	--	--	--	--	--	Non-community Public	Clearwater Resort	Ozark Aquifer	--
PDWP	103074	--	350	--	--	1988	Community Public	Oak Bluff Condominiums	Ozark Aquifer	--
PDWP	103364	--	--	--	--	--	Municipal	Linn Creek	Ozark Aquifer	--

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
PDWP	103789	860	528	--	104	1984	Municipal	Linn Creek	Ozark Aquifer	70
PDWP	103975	340	100	--	--	1978	Non-community Public	Guido & Frankies	Ozark Aquifer	--
PDWP	103982	--	--	--	--	--	Community Public	Country Meadows Estates	Ozark Aquifer	--
PDWP	104064	1000	425	--	--	1997	Community Public	Seven Trails West Subdivision	Ozark Aquifer	--
PDWP	105033	565	337	--	90	--	Community Public	Camden Co. PWSD #5 - Clearwater Condo	Ozark Aquifer	120
PDWP	105998	--	--	--	--	--	Community Public	Timberlake Terrace	Ozark Aquifer	--
WIMS	4044	425	84	--	185	1987	Domestic	--	Ozark Aquifer	40
WIMS	5142	360	105	--	160	1988	Domestic	--	Ozark Aquifer	35
WIMS	5557	300	126	--	200	1988	Domestic	--	Ozark Aquifer	25
WIMS	7295	380	126	--	270	1988	Domestic	--	Ozark Aquifer	40
WIMS	7296	380	85	--	250	1988	Domestic	--	Ozark Aquifer	20
WIMS	7320	155	105	--	20	1988	Domestic	--	Ozark Aquifer	60
WIMS	8591	322	106	--	25	1988	Domestic	--	Ozark Aquifer	40
WIMS	8592	385	84	--	180	1988	Domestic	--	Ozark Aquifer	30
WIMS	8719	400	181	--	155	1988	Domestic	--	Ozark Aquifer	30
WIMS	11489	400	106	--	160	1988	Domestic	--	Ozark Aquifer	25
WIMS	11697	375	80	--	--	1988	Domestic	--	Ozark Aquifer	18
WIMS	14203	340	168	--	210	1987	Domestic	--	Ozark Aquifer	35
WIMS	16083	251	86	--	--	1989	Domestic	--	Ozark Aquifer	30
WIMS	16654	218	126	--	--	1989	Domestic	--	Ozark Aquifer	25
WIMS	24383	415	80	--	--	2000	Domestic	--	Ozark Aquifer	35
WIMS	24538	380	140	945	208	2005	Domestic	--	Ozark Aquifer	20
WIMS	35888	333	121	--	210	1991	Domestic	--	Ozark Aquifer	20
WIMS	35889	332	80	--	180	1994	Domestic	--	Ozark Aquifer	18
WIMS	43866	400	103	--	207	1990	Domestic	--	Ozark Aquifer	20
WIMS	43978	100	60	--	--	1989	Domestic	--	Ozark Aquifer	25
WIMS	46895	377	119	--	205	1993	Domestic	--	Ozark Aquifer	25
WIMS	52598	312	100	--	155	1992	Domestic	--	Ozark Aquifer	25
WIMS	52601	210	140	--	40	1993	Domestic	--	Ozark Aquifer	50
WIMS	52632	210	120	665	45	1992	Domestic	--	Ozark Aquifer	30
WIMS	54160	500	355	--	230	1990	Domestic	--	Ozark Aquifer	30
WIMS	54161	340	106	--	166	1990	Domestic	--	Ozark Aquifer	22
WIMS	54164	355	170	905	207	1990	Domestic	--	Ozark Aquifer	30
WIMS	54493	282	126	--	35	1990	Domestic	--	Ozark Aquifer	35
WIMS	62718	200	100	--	12	1991	Domestic	--	Ozark Aquifer	60
WIMS	62774	360	144	--	205	1991	Domestic	--	Ozark Aquifer	30
WIMS	64171	170	124	--	30	1991	Domestic	--	Ozark Aquifer	30
WIMS	68406	220	120	679	18	1991	Domestic	--	Ozark Aquifer	8
WIMS	77412	351	80	--	150	1992	Domestic	--	Ozark Aquifer	25
WIMS	77419	360	80	--	210	1992	Domestic	--	Ozark Aquifer	40
WIMS	77420	370	80	--	195	1992	Domestic	--	Ozark Aquifer	20
WIMS	91373	480	105	--	290	1993	Domestic	--	Ozark Aquifer	20
WIMS	91400	360	84	--	225	1993	Domestic	--	Ozark Aquifer	25
WIMS	100968	460	167	--	196	1994	Domestic	--	Ozark Aquifer	15

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	120268	200	144	807	80	--	Domestic	--	Ozark Aquifer	30
WIMS	120299	280	--	--	--	1994	Domestic	--	Ozark Aquifer	--
WIMS	120864	375	100	--	270	1994	Domestic	--	Ozark Aquifer	20
WIMS	120865	377	126	--	220	1994	Domestic	--	Ozark Aquifer	20
WIMS	120872	393	100	--	260	1994	Domestic	--	Ozark Aquifer	25
WIMS	120873	170	110	--	25	1994	Domestic	--	Ozark Aquifer	20
WIMS	135731	410	115	925	--	1995	Domestic	--	Ozark Aquifer	30
WIMS	138031	351	100	--	155	1995	Domestic	--	Ozark Aquifer	25
WIMS	138032	333	107	954	165	1995	Domestic	--	Ozark Aquifer	30
WIMS	138045	385	130	816	20	1996	Domestic	--	Ozark Aquifer	25
WIMS	138061	310	80	--	170	1996	Domestic	--	Ozark Aquifer	20
WIMS	138062	333	108	--	--	1995	Domestic	--	Ozark Aquifer	25
WIMS	138063	333	80	--	170	1996	Domestic	--	Ozark Aquifer	30
WIMS	138069	371	105	--	170	1996	Domestic	--	Ozark Aquifer	25
WIMS	138081	310	80	--	145	1996	Domestic	--	Ozark Aquifer	20
WIMS	138809	460	100	984	315	1995	Domestic	--	Ozark Aquifer	25
WIMS	148329	415	100	--	150	1996	Domestic	--	Ozark Aquifer	50
WIMS	148583	320	105	846	175	1995	Domestic	--	Ozark Aquifer	40
WIMS	148588	320	104	--	110	1995	Domestic	--	Ozark Aquifer	40
WIMS	154630	178	100	768	--	1996	Domestic	--	Ozark Aquifer	60
WIMS	157785	150	120	670	7	1996	Domestic	--	Ozark Aquifer	30
WIMS	158056	410	157	1030	220	1997	Domestic	--	Ozark Aquifer	25
WIMS	169782	300	97	--	175	1997	Domestic	--	Ozark Aquifer	30
WIMS	173793	430	142	--	260	1996	Domestic	--	Ozark Aquifer	50
WIMS	181023	340	120	669	12	1997	Domestic	--	Ozark Aquifer	30
WIMS	186130	440	100	984	260	1998	Domestic	--	Ozark Aquifer	30
WIMS	189061	375	80	--	205	1997	Domestic	--	Ozark Aquifer	--
WIMS	189063	353	100	807	185	1997	Domestic	--	Ozark Aquifer	--
WIMS	189065	353	100	--	240	1997	Domestic	--	Ozark Aquifer	--
WIMS	189073	370	110	--	210	1997	Domestic	--	Ozark Aquifer	20
WIMS	189075	210	110	660	20	1997	Domestic	--	Ozark Aquifer	--
WIMS	189088	350	80	945	--	1997	Domestic	--	Ozark Aquifer	25
WIMS	189097	170	100	--	30	1997	Domestic	--	Ozark Aquifer	20
WIMS	190858	280	102	846	140	1998	Domestic	--	Ozark Aquifer	20
WIMS	198718	360	250	--	175	1998	Domestic	--	Ozark Aquifer	15
WIMS	208682	427	100	--	350	1998	Domestic	--	Ozark Aquifer	15
WIMS	209918	460	80	--	230	1999	Domestic	--	Ozark Aquifer	35
WIMS	209943	380	100	--	200	1999	Domestic	--	Ozark Aquifer	25
WIMS	210501	180	120	685	30	1998	Domestic	--	Ozark Aquifer	40
WIMS	214483	375	100	--	205	1999	Domestic	--	Ozark Aquifer	30
WIMS	217588	170	105	660	30	1997	Domestic	--	Ozark Aquifer	25
WIMS	217600	190	84	--	30	1998	Domestic	--	Ozark Aquifer	25
WIMS	217602	190	80	--	25	1998	Domestic	--	Ozark Aquifer	25
WIMS	217613	395	103	--	265	1998	Domestic	--	Ozark Aquifer	20

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	221967	340	100	1000	210	2000	Domestic	--	Ozark Aquifer	35
WIMS	226701	420	100	--	200	2000	Domestic	--	Ozark Aquifer	45
WIMS	226703	200	120	649	12	2000	Domestic	--	Ozark Aquifer	30
WIMS	226704	380	100	--	180	2000	Domestic	--	Ozark Aquifer	50
WIMS	226713	300	100	--	90	1999	Domestic	--	Ozark Aquifer	50
WIMS	226740	380	80	--	--	2002	Domestic	--	Ozark Aquifer	30
WIMS	226768	440	100	990	290	1999	Domestic	--	Ozark Aquifer	30
WIMS	228440	215	117	689	10	2000	Domestic	--	Ozark Aquifer	25
WIMS	228688	200	120	690	22	1999	Domestic	--	Ozark Aquifer	25
WIMS	228722	300	120	930	180	1999	Domestic	--	Ozark Aquifer	40
WIMS	236450	370	100	--	220	1998	Domestic	--	Ozark Aquifer	25
WIMS	237676	240	120	689	18	2000	Domestic	--	Ozark Aquifer	40
WIMS	247527	405	--	--	250	2006	Domestic	--	Ozark Aquifer	--
WIMS	247650	--	--	--	200	2010	Domestic	--	Ozark Aquifer	--
WIMS	251146	440	140	1080	--	2000	Domestic	--	Ozark Aquifer	25
WIMS	252744	400	80	960	248	2000	Domestic	--	Ozark Aquifer	30
WIMS	252907	380	140	964	252	2001	Domestic	--	Ozark Aquifer	40
WIMS	255051	450	100	--	220	2000	Domestic	--	Ozark Aquifer	40
WIMS	255063	400	100	--	200	2000	Domestic	--	Ozark Aquifer	35
WIMS	256055	350	80	--	220	2001	Domestic	--	Ozark Aquifer	20
WIMS	256365	190	80	--	20	2000	Domestic	--	Ozark Aquifer	30
WIMS	263081	370	92	--	230	2001	Domestic	--	Ozark Aquifer	25
WIMS	263087	375	80	--	145	2000	Domestic	--	Ozark Aquifer	18
WIMS	263102	497	100	--	340	2001	Domestic	--	Ozark Aquifer	25
WIMS	263110	370	80	--	188	2002	Domestic	--	Ozark Aquifer	25
WIMS	271430	340	80	--	130	2001	Domestic	--	Ozark Aquifer	26
WIMS	274486	180	100	787	6	2002	Domestic	--	Ozark Aquifer	30
WIMS	274511	400	140	925	248	2001	Domestic	--	Ozark Aquifer	30
WIMS	278442	350	90	--	195	2002	Domestic	--	Ozark Aquifer	25
WIMS	278458	370	110	--	200	2002	Domestic	--	Ozark Aquifer	20
WIMS	293094	400	120	860	270	2002	Domestic	--	Ozark Aquifer	30
WIMS	294601	425	122	925	260	2002	Domestic	--	Ozark Aquifer	49
WIMS	309062	420	100	--	181	2003	Domestic	--	Ozark Aquifer	35
WIMS	309093	240	80	689	28	2002	Domestic	--	Ozark Aquifer	40
WIMS	310109	340	160	920	172	2005	Domestic	--	Ozark Aquifer	30
WIMS	319713	400	120	--	200	2003	Domestic	--	Ozark Aquifer	--
WIMS	321163	370	110	--	165	2003	Domestic	--	Ozark Aquifer	20
WIMS	321165	310	100	--	109	2003	Domestic	--	Ozark Aquifer	25
WIMS	321252	500	100	--	328	2004	Domestic	--	Ozark Aquifer	35
WIMS	321693	460	160	1060	252	2003	Domestic	--	Ozark Aquifer	30
WIMS	322919	375	100	--	200	2003	Domestic	--	Ozark Aquifer	35
WIMS	327008	440	120	--	198	2004	Domestic	--	Ozark Aquifer	30
WIMS	332766	560	140	1023	294	2005	Domestic	--	Ozark Aquifer	15
WIMS	334804	305	--	--	--	2005	Domestic	--	Ozark Aquifer	--

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	334805	205	--	--	--	2005	Domestic	--	Ozark Aquifer	--
WIMS	334823	305	81	920	160	2005	Domestic	--	Ozark Aquifer	25
WIMS	336818	400	80	--	231	2004	Domestic	--	Ozark Aquifer	35
WIMS	355292	420	80	--	160	2005	Domestic	--	Ozark Aquifer	65
WIMS	356036	325	81	--	17	2005	Domestic	--	Ozark Aquifer	30
WIMS	356291	360	160	--	238	2005	Domestic	--	Ozark Aquifer	30
WIMS	365690	500	80	--	265	2005	Domestic	--	Ozark Aquifer	25
WIMS	368161	440	160	--	170	2006	Domestic	--	Ozark Aquifer	30
WIMS	368198	380	160	--	190	2006	Domestic	--	Ozark Aquifer	20
WIMS	368912	420	80	--	270	2006	Domestic	--	Ozark Aquifer	25
WIMS	369248	467	161	--	245	2006	Domestic	--	Ozark Aquifer	30
WIMS	376995	405	81	--	260	2006	Domestic	--	Ozark Aquifer	45
WIMS	377005	265	105	--	15	2006	Domestic	--	Ozark Aquifer	35
WIMS	377014	385	81	--	180	2006	Domestic	--	Ozark Aquifer	35
WIMS	377617	245	81	--	80	2006	Domestic	--	Ozark Aquifer	30
WIMS	394002	390	100	--	188	2006	Domestic	--	Ozark Aquifer	60
WIMS	394003	270	80	--	100	2006	Domestic	--	Ozark Aquifer	40
WIMS	394004	190	80	--	20	2006	Domestic	--	Ozark Aquifer	35
WIMS	394884	400	80	--	260	2006	Domestic	--	Ozark Aquifer	25
WIMS	394894	230	120	--	30	2007	Domestic	--	Ozark Aquifer	35
WIMS	394912	220	120	--	10	2007	Domestic	--	Ozark Aquifer	30
WIMS	404100	520	120	--	292	2008	Domestic	--	Ozark Aquifer	12
WIMS	413292	520	115	--	200	2007	Domestic	--	Ozark Aquifer	20
WIMS	417516	230	120	--	15	2007	Domestic	--	Ozark Aquifer	30
WIMS	417535	250	120	--	20	2007	Domestic	--	Ozark Aquifer	35
WIMS	441778	365	122	--	180	2009	Domestic	--	Ozark Aquifer	30
WIMS	441911	405	82	--	240	2010	Domestic	--	Ozark Aquifer	25
WIMS	441913	385	82	--	240	2010	Domestic	--	Ozark Aquifer	30
WIMS	441943	365	83	--	160	2010	Domestic	--	Ozark Aquifer	30
WIMS	446162	580	115	--	200	2010	Domestic	--	Ozark Aquifer	35
WIMS	447228	405	105	--	160	2011	Domestic	--	Ozark Aquifer	50
WIMS	447257	465	103	--	218	2010	Domestic	--	Ozark Aquifer	20
WIMS	473508	520	200	--	312	2012	Domestic	--	Ozark Aquifer	40
WIMS	477101	230	95	--	40	2012	Domestic	--	Ozark Aquifer	25
WIMS	477127	405	95	--	150	2013	Domestic	--	Ozark Aquifer	30
WIMS	477132	400	75	--	180	2014	Domestic	--	Ozark Aquifer	25
WIMS	477133	230	135	--	20	2014	Domestic	--	Ozark Aquifer	30
WIMS	477143	440	95	--	160	2014	Domestic	--	Ozark Aquifer	35
WIMS	478815	250	100	--	90	2013	Domestic	--	Ozark Aquifer	20
WIMS	479307	420	280	--	190	2013	Domestic	--	Ozark Aquifer	30
WIMS	491511	575	95	--	260	2014	Domestic	--	Ozark Aquifer	35
WIMS	495133	420	100	--	200	2015	Domestic	--	Ozark Aquifer	30
WIMS	504911	260	120	--	22	2015	Domestic	--	Ozark Aquifer	40
WIMS	505868	255	115	--	30	2016	Domestic	--	Ozark Aquifer	40

Water wells located within 4 miles of Dawson Metal Products Facility #2 site.

Source	Well ID	Depth	Casing	Elev.	SWL	Date	Use	Owner	Geohydrologic Unit	Yield
WIMS	513696	465	83	--	180	2016	Domestic	--	Ozark Aquifer	30
WIMS	513705	475	163	--	30	2016	Domestic	--	Ozark Aquifer	120
WIMS	518734	420	180	--	270	2016	Domestic	--	Ozark Aquifer	30
Logmain	13462	275	--	1065	225	1955	Domestic	Chandler	Ozark Aquifer	--
Logmain	13599	212	--	989	52	1955	Domestic	Dillenberger	Ozark Aquifer	--
Logmain	27908	300	--	--	120	1975	Domestic	Stewart	Ozark Aquifer	--
Logmain	28554	447	--	824	260	1978	Domestic	Darmpier	Ozark Aquifer	--

Wells found within 3 to 4 miles of the site: 189

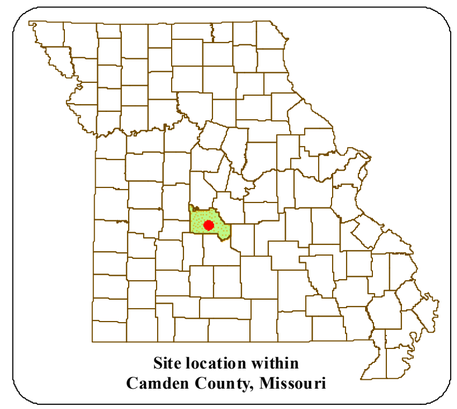
Figure 2:
Four-Mile Well Survey
Dawson Metal Products Facility #2 Site
Camden County, Missouri
September 12, 2017

Target Limits

- 0.25 Mile
- 0.5 Mile
- 1 Mile
- 2 Mile
- 3 Mile
- 4 Mile

N
W E
S

- Dawson Metal Products Facility #2 site
- Well from Public Drinking Water Program
- Certified well from the Well Information Management System (WIMS)
- Well from MDNR/MGS sample well-log library (Logmain)
- Municipal and county public water supply districts



Site location within
Camden County, Missouri

1 0.5 0 1 2 3 4 5 6 7
Miles

Dawson Metal Products Camdenton Facility #2
Camdenton, MO
Site Investigation
Bachle, 2018

Missouri Depar
NATURAL RESOURCES
Eric R. Greitens, Governor
Carol S. Comer, Director

MEMORANDUM

STATE OF MISSOURI
BRENNA E. MCDONALD
PG
2010011411
REGISTERED GEOLOGIST

3/29/18
2 pages

DATE: March 29, 2018

TO: Amanda Branson, Environmental Specialist,
Hazardous Waste Program,
Division of Environmental Quality (DEQ)

FROM: Peter Bachle, Geologist
Geological Survey Program,
Missouri Geological Survey (MGS)

SUBJECT: Response to Dawson Metal Products #2 E-mail Dated March 20, 2018

LOCATION: NE ¼, SW ¼, SE¼ of Section 26, Township 38 North, Range 17 West,
Hahatonka 7.5-Minute Quadrangle, Camden County, Missouri
Approximately 37.9988° North Latitude and 92.7634° West Longitude

On March 20, 2018, you requested information by e-mail with regard to the Dawson Metal Products #2 site. The questions were; (1) whether a significant historic release of TCE at the site could have contributed to contamination of the Ozark Aquifer and (2) would the capture zone of either the Blair Heights or Mulberry wells be impacted by site-originated TCE.

The uppermost bedrock at the site is Gasconade Dolomite. Since the Gasconade Dolomite is one of the formations included in the Ozark Aquifer and no confining layers exist within the Gasconade Dolomite, any contaminants entering the saturated portion of the Gasconade Dolomite (entering groundwater) will result in contamination of the Ozark Aquifer. This is true for any TCE entering groundwater in saturated bedrock at the Dawson Metal Products #2 site.

The answer for the question of whether site contamination could impact the capture zone of either the Blair Heights or Mulberry wells is as follows.

Since the Mulberry well is located approximately ¾-mile away in an up groundwater gradient direction (based upon monitoring well data from the Modine and Hulett Lagoon

Recycled paper

sites), it is unlikely that the Dawson Metal Products #2 site is contributing contamination to the Mulberry well.

Due to the ¼-mile distance of the site to the well, the existence of dissolution channels in the bedrock, and the unknown extent of the capture zone for the Blair Heights well, there is a possibility that contaminants originating at the Dawson Metal Products #2 site could impact the Blair Heights well, however, the likelihood is low since the well is up groundwater gradient from the site.

CITCAT Meeting Notes
January 9, 2018, 5-7pm
Community Christian Church, Camdenton MO

Group members present were Don Barrett, Dale Bland, Jessica Bockoven, Bryant Burton, Leslie Chamberlin, Larry Coleman, Steve Eden, Danielle Farson, James Gohagan, Greg Hasty, Pam Holley, Jannea Hazama, Shawn Kober, Jerry Rogers, Scott Martin, and Jack Quade. The media and approximately 15 community members were also present.

Agenda (*attached*)

Meeting called to start by Chairman

Correction to December Meeting Notes: Discussion to clarify the process - If a Core Member leaves the Group, they will be replaced from the Group and if a Group Member leaves the Group, they will not be replaced.

Meeting Presentation: Valerie Wilder, MDNR, opened the Meeting discussing the Advisory Team structure and process. She presented on current investigations throughout the Meeting from slides. She also brought copies of the two current work plans – one for Dawson Site #2 and one for the Lagoon soil gas investigation.

The presentation also presented the current Mission Statement:

> "The mission of the Camdenton Industrial TCE Contamination Advisory Team (CITCAT) is to meet as needed to investigate the misuse of chemicals as related to industrial manufacturing; to play an intermediary and transparent role between the community, the Missouri Department of Natural Resources and potential responsible parties (PRPs); and create an open dialogue between the community, the department and PRPs. The CITCAT will make recommendations and report findings to the department. The CITCAT will also strive to ensure that current/future generations and the environment of Camdenton are protected for all its citizens."

Comments and Questions During the Meeting

Concerns over the integrity of sampling conducted by the City and/or the PRPs was expressed. Ms. Wilder explained that, for sampling overseen by MDNR, the consultant must submit a work plan prior to conducting the work which is reviewed by MDNR and, if needed, modified by the consultant at the direction of MDNR. MDNR staff accompany and oversee the sampling to assure that work is being conducted according to what is agreed. MDNR also receives and reviews the lab results and sampling results report.

Investigations and removals at the former Modine facility were discussed. Mr. Coleman indicated that he was aware that dumping had occurred in 1972 and continued for years. MDNR indicated that a soil gas investigation had been conducted at the facility in approximately 2015 and that removal of a significant amount of soil was conducted in approximately the 2001-2002 period.

Discussion on the renaming of the "Former Hulett Lagoon" to another name was had. Suggestions for naming included the formerly used name of "City Lagoon #3". Members indicated it also used to be called "Factory Lagoon". Chairman

indicated he had spoken with the City and they were open to renaming it. MDNR indicated that they would not be able to change the name in historical documents and some other situations as it was written into agreements as "Hulett Lagoon" but was open to using a new name, where able, in the future.

Discussion of potential historical discharge to the C. P. White Lagoon was had. One member indicated that discharge may have occurred for a period of 2 years to this second lagoon through the "#7 lift station". MDNR noted this possibility.

Ms. Wilder responded to questions regarding the presence of TCE in sampling conducted at/adjacent to the airport runway. The highlights were:

- The detection limit for TCE in recent sampling of private wells was 5 ppb. All samples indicated no detections of TCE, which is presented in lab results as "<5 ppb", which may have led to some confusion.
- Ms. Wilder was present in the 1999 sampling and they sampled private wells at that time; no TCE was detected.
- Sludge was not tested for TCE in the 1990s (they had sampled for metals).
- Sludge was observed in more recent sampling at the end of the airport runway. It was sampled and indicated metals, but no TCE.
- No TCE was detected in drinking water wells surrounding the investigation area.
- MDNR considers the airport investigation complete and no further action is to be taken at that location at this time.

Discussion on cancer rates in the area was had. Ms. Chamberlin, Ms. Farson, and Ms. Bockoven indicated community members were working together to examine the cancer occurrences in the area of the Site, most notably the possibility of an increased breast cancer occurrence.

Member indicated that he had worked for Modine and that they went to great strides to change the cleaning chemicals they used at the plant during his time there. Subsequent discussion on recognition of the hazards of these chemicals and when environmental laws were enacted were had. MDNR indicated that the CERCLA (Superfund) law was enacted in 1980 and the RCRA laws in 1984.

For a question on whether TCE can be detected in the body, Mr. Burton indicated that TCE can be detected in breath, urine and blood.

Suggestions as to presentations that be useful for the Group were had. These included health questions, past investigations and remediation completed, and understanding lab results. The Group agreed that a presentation on health was wanted. MDNR indicated that the MO DHHS ("Health Department") can provide a presentation. Pam Holley indicated that Hamilton Sundstrand has offered to obtain and provide a toxicologist experienced with TCE issues to present to the Group. The Group indicated it would be interested in both. MDNR requested that a list of topics and questions be compiled by the Group in order for DHHS to prepare and focus the presentation.

Mr. Coleman indicated that he knew where toluene may have been dumped – at a re-melt facility on South Highway 5. MDNR noted this.

Discussion of Meeting locations was had. Hamilton Sundstrand had offered to pay the Fire Department's room fee for four months. Mr. Hasty indicated that he may be able to get space at the Court House. *Subsequent/side conversations*

with Mr. Hasty, Ms. Holley and Ms. Lamons, MDNR, were had on the projector equipment available at the Fire Department and it was tentatively planned that MDNR would contract with the Fire Department and Hamilton Sundstrand would pay for four months of meetings at that location in order to have the projector capabilities for the Group/public.

Discussion on the public's concern to have their water tested was had. Members indicated that Culligan would test water for approximately $127. Chairman asked MDNR to relay information, from their previous discussion, on the possibility of MDNR sampling municipal water, rather than the City, to address some of the distrust issues between the public and City. MDNR indicated that the City was open to MDNR personnel, rather than City personnel, conducting the next round of required sampling of the three public wells in the community. The City will give them access and MDNR will take the samples to the state lab in Jeff City. It may be possible to move the sampling to an earlier time. Further discussion as to permit requirements on the timing was to be held between the Group, MDNR and the City. Mr. Phil Morgan, Camdenton City Attorney, asked if MDNR would be able to come down more often if the City needed and he and Mr. Hasty indicated that the City Council members, who live here, want clean water too.

Suggestion to move or copy site-related documents onto the CITCAT page on the MDNR website was given, to make it easier for the community to access them, and MDNR indicated that they could do that.

Time ran out for the Meeting. The next meeting is to be held on February 13, 2018; anticipated to be at the Mid-County Fire Department.

Meeting was concluded by the Chairman.

Attachments: A. Agenda

Attachment A. Meeting Agenda

MEETING AGENDA FOR TUESDAY, JANUARY 9, 2018 AT 5PM

Old Business

•Clarification of the water testing process being done in Camdenton by MoDNR

•Water sampling, possible solution is to have a board member attend the sampling done by the city

•Historic ownership of the facility and surrounding properties (we have the information of the current)

•Understanding and clarification of funds that will be available to us (the group) from MoDNR

•Official name change of Hullett lagoon

•Airport testing, results, and a path forward with contamination showing up in homes there now

New Business

•What was the cities role in deciding how Dawson, Sundstrand, Modine dealt with disposing of TCE at the (currently) Laker Tackle building

•Increasing frequency of meetings for a few months until we get everything lined out

•Getting the lagoon's current samples or recent sampling

•Any communications between the city and MoDNR regarding mulberry well, Hullett lagoon

•Getting maps showing the current plume in proximity to the town and properties and ownership, do the land owners know they are in possession of potentially blighted land

•Understanding what relation the TCE contamination has to the various caves and state parks, example Bridal Cave, Ozark Caverns have shown TCE contamination any information to relay this to the public

Search Results - Camden County, MO

Lot	Block	Unit	Subdivision Name	Free Form	Series	Book	Page	Inst #	Rec Date	Instr	Grantor	Grantee
24			LAKE DRIVE ADD TO CAMDENTON		REAL	67	37	R00670037	01/10/1935	RL	CAMDEN COUNTY BANK	WEBB, C E
24			LAKE DRIVE ADD TO CAMDENTON		REAL	70	70	R00700070	10/11/1937	WD	WEBB, C E	EDWARDS, DOYLE
24			LAKE DRIVE ADD TO CAMDENTON		REAL	77	607	R00770607	07/01/1944	WD	EDWARDS, DOYLE	REYNOLDS, BEN L
24			LAKE DRIVE ADD TO CAMDENTON		REAL	92	433	R00920433	08/06/1951	WD	REYNOLDS, BEN L.	BOLLENBACHER, GEORGE M.
24			LAKE DRIVE ADD TO CAMDENTON		REAL	96	173	R00960173	04/09/1953	WD	BOLLENBACHER, GEORGE	BRINCKMANN, CHARLES A.
24			LAKE DRIVE ADD TO CAMDENTON		REAL	107	571	R01070571	10/23/1957	MISC	PLAZA CRAFT BOAT CO	ST. LOUIS TERMINIAL FIELD
24			LAKE DRIVE ADD TO CAMDENTON		REAL	110	325	R01100325	05/22/1958	MISC	PLAZA CRAFT BOAT CO	ST. LOUIS TERMINAL FIELD
24			LAKE DRIVE ADD TO CAMDENTON		REAL	113	17	R01130017	10/23/1958	DEED	BRINCKMANN, C. A.	PLAZA CRAFT BOAT CO
24			LAKE DRIVE ADD TO CAMDENTON		REAL	112	18	R01120018	02/06/1959	WD	BRINCKMANN, C. A.	CAMDENTON INDUSTRIAL D
24			LAKE DRIVE ADD TO CAMDENTON		REAL	125	386	R01250386	03/22/1963	MISC	CAMDENTON INDUSTRIAL	COX, EDWIN W.
24			LAKE DRIVE ADD TO CAMDENTON	WITH EASEMENT	REAL	129	221	R01290221	03/26/1964	EASE	CAMENTON INDUSTRIAL D	STATE HIGHWAY COMMISSI
24			LAKE DRIVE ADD TO CAMDENTON		REAL	129	223	R01290223	03/26/1964	MISC	BRINCKMANN, C. A.	STATE HIGHWAY COMMISSI
24			LAKE DRIVE ADD TO CAMDENTON		REAL	144	181	R01440181	09/13/1967	WD	CAMDENTON INDUSTRIAL	W. T. COX COMPANY, INC.
24			LAKE DRIVE ADD TO CAMDENTON		DT	80	931	D00800931	02/14/1969	DT	W. T. COX CO., INC.	FIRST NATIONAL BANK
24			LAKE DRIVE ADD TO CAMDENTON		REAL	175	5	R01750005	07/06/1973	WD	ISCO MANUFACTURING CO	ISC INDUSTRIES, INC.
24			LAKE DRIVE ADD TO CAMDENTON		REAL	175	545	R01750545	08/04/1973	WD	ISC INDUSTRIES INC.	DICKERSON, JACK
24			LAKE DRIVE ADD TO CAMDENTON		DT	88	945	D00880945	08/04/1973	DT	DICKERSON, JACK	CAMDEN COUNTY BANK
24			LAKE DRIVE ADD TO CAMDENTON		REAL	182	21	R01820021	09/18/1974	WD	DICKERSON, JACK	DICKERSON SUPPLY CO., IN
24			LAKE DRIVE ADD TO CAMDENTON		DT	91	463	D00910463	10/15/1974	DT	DICKERSON SUPPLY CO, IN	KANSAS CITY LIFE INSURAN
24			LAKE DRIVE ADD TO CAMDENTON		REAL	182	445	R01820445	10/15/1974	RL	CAMDEN COUNTY BANK	DICKERSON, JACK
24			LAKE DRIVE ADD TO CAMDENTON		DT	92	317	D00920317	04/28/1975	DT	CIAPINSKI, MARY	FIRST NATIONAL BANK OF LI
24			LAKE DRIVE ADD TO CAMDENTON		REAL	195	744	R01950744	12/23/1976	WD	DICKERSON SUPPLY CO., I	DICKERSON, JACK
24			LAKE DRIVE ADD TO CAMDENTON	WITH EASEMENT	REAL	211	816	R02110816	01/11/1979	EASE	DICKERSON, JACK	SOUTHWESTERN BELL TELEP
24			LAKE DRIVE ADD TO CAMDENTON		REAL	261	557	R02610557	08/31/1984	RL	KANSAS CITY LIFE INSURA	DICKERSON SUPPLY CO., IN
24			LAKE DRIVE ADD TO CAMDENTON		REAL	279	727	R02790727	12/30/1985	WD	DICKERSON, JACK	DICKERSON PARTNERSHIP
24			LAKE DRIVE ADD TO CAMDENTON		DT	130	285	D01300285	07/02/1986	DT	DICKERSON PARTNERSHIP	FIRST NATIONAL BANK
24			LAKE DRIVE ADD TO CAMDENTON		DT	131	388	D01310388	09/10/1986	DT	GENESIS ACQUISITION CO	REAL PROPERTIES, INC.
24			LAKE DRIVE ADD TO CAMDENTON		REAL	296	320	R02960320	03/25/1987	MISC	DICKERSON SUPPLY COMP	STEPHENS INC.
24			LAKE DRIVE ADD TO CAMDENTON		DT	133	912	D01330912	03/25/1987	DT	DICKERSON SUPPLY COMP	NBD BUSINESS FINANCE, IN
24			LAKE DRIVE ADD TO CAMDENTON		DT	133	913	D01330913	03/25/1987	DT	DICKERSON SUPPLY COMP	NBD BUSINESS FINANCE, IN
24			LAKE DRIVE ADD TO CAMDENTON		REAL	296	402	R02960402	03/26/1987	MISC	DICKERSON SUPPLY COMP	NBD BUSINESS FINANCE, IN
24			LAKE DRIVE ADD TO CAMDENTON		REAL	307	324	R03070324	01/06/1988	MISC	HUB CITY PUBLISHING CO	RICHARDS, GRANT T.
24			LAKE DRIVE ADD TO CAMDENTON		REAL	307	326	R03070326	01/06/1			

Printed: 7/26/2017

Dawson Metal Products Camdenton Facility #2
Camdenton, Mo
Site Investigation
CCAO, 2017

Search Results - Camden County, MO

Lot	Block	Unit	Subdivision Name	Free Form	Series	Book	Page	Inst #	Rec Date	Instr	Grantor	Grantee
24			LAKE DRIVE ADD TO CAMDENTON		DT	137	958	D01370958	01/06/1988	DT	DICKERSON PARTNERSHIP	RICHARDS, GRANT T.
24			LAKE DRIVE ADD TO CAMDENTON		DT	205	628	D02050628	06/07/2000	DT	DICKERSON BUILDING PAR	COMMERCE BANK, N.A.
24			LAKE DRIVE ADD TO CAMDENTON		REAL	497	801	R04970801	06/21/2000	MISC	DICKERSON, JACK	DICKERSON SUPPLY COMPA
24			LAKE DRIVE ADD TO CAMDENTON		REAL	518	262	R05180262	07/30/2001	RL	FIRST NATIONAL BANK	DICKERSON PARTNERSHIP
24			LAKE DRIVE ADD TO CAMDENTON	WITH EASEMENT	REAL	548	16	R05480016	12/09/2002	EASE	DICKERSON PARTNERSHIP	CAMDENTON CITY OF
24			LAKE DRIVE ADD TO CAMDENTON		REAL	558	400	R05580400	05/14/2003	WD	DICKERSON, BUILDING PA	DICKERSON BUILDING, LLC
24			LAKE DRIVE ADD TO CAMDENTON		REAL	568	320	R05680320	09/15/2003	MISC	COMMERCE BANK, N.A.	COMMERCE BANK, N.A.
24			LAKE DRIVE ADD TO CAMDENTON		DT	236	568	D02360568	09/15/2003	DT	DICKERSON BUILDING, LLC	COMMERCE BANK, NA.
24			LAKE DRIVE ADD TO CAMDENTON		REAL	568	321	R05680321	09/15/2003	MISC	DICKERSON BUILDING, LLC	COMMERCE BANK, N.A.
24			LAKE DRIVE ADD TO CAMDENTON		REAL	571	335	R05710335	10/27/2003	RL	COMMERCE BANK N.A.	DICKERSON PARTNERSHIP
24			LAKE DRIVE ADD TO CAMDENTON		REAL	596	265	R05960265	01/07/2005	RL	RICHARDS, GRANT T.	DICKERSON PARTNERSHIP

175-5

bk 175 pg 005

General Warranty Deed

BY A CORPORATION

THIS INDENTURE, Made on the 10th day July A. D. One Thousand Nine Hundred and Seventy-two by and between

ISCO MANUFACTURING COMPANY

a Corporation organized and existing under the laws of the State of , Party of the first part, and

ISC INDUSTRIES, INC., 3430 Broadway, Kansas City, Mo.

of the County of Jackson in the State of Missouri

part y of the second part:

WITNESSETH, That the said party of the first part, in consideration of the sum of

* * * TEN DOLLARS and Other Considerations * * * DOLLARS,

to it paid by the said part y of the second part, the receipt of which is hereby acknowledged, does by these presents, Grant, Bargain and Sell, Convey and Confirm unto the said part y of the second part, its successors and assigns, the following described Lots, Tracts or Parcels of Land, lying, being and situate in the County of Camden and State of Missouri , to-wit: All of Tracts 24 and 25 in LAKE DRIVE ADDITION TO THE ORIGINAL TOWN OF CAMDENTON, MISSOURI, according to the plat thereof on file and of record in the Office of the Recorder of Deeds, Camden County, Missouri.

Subject to all restrictions, reservations, conditions and easements of record and to all existing roads and power lines, whether of record or not.

TO HAVE AND TO HOLD the premises aforesaid with all and singular the Rights, Privileges, Appurtenances and Immunities thereto belonging, or in anywise appertaining, unto the said party of the second part and unto its successors and assigns, FOREVER, the said ISCO MANUFACTURING COMPANY hereby covenanting that it is lawfully seized of an indefeasible Estate in Fee in the premises herein conveyed; that it has good right to convey the same; and that the said premises are free and clear of any incumbrances done or suffered by it or those under whom it claims, and that it will Warrant and Defend the title to the said premises unto the said party of the second part, and unto its successors and assigns, Forever against the lawful claims and demands of all persons whomsoever.

IN WITNESS WHEREOF, The said party of the first part has caused these presents to be signed by its president, and its corporate seal to be hereto affixed, the day and year first above written.

Attest: [illegible] Secretary

By Paul R. Stewart Vice President

STATE OF MISSOURI,
County of Jackson } ss.

On this 10th day of July, 1972, before me appeared

to me personally known, who, being by me duly sworn, did say that he is the president of

ISCO MANUFACTURING COMPANY

a Corporation of the State of Missouri, and that the seal affixed to foregoing instrument is the corporate seal of said Corporation, and that said instrument was signed and sealed in behalf of said Corporation by authority of its Board of Directors and said Paul R. Stewart acknowledged said instrument to be the free act and deed of said Corporation.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at my office in , the day and year first above written.

My term expires June 1, 1973.

Geraldine A. [illegible]
Notary Public

BK 175 PG 5 WD

General Warranty Deed

BY A CORPORATION

FROM

TO

Filed for Record this ... day of ... A. D. 19..
at ... o'clock ... minutes ... M.
Recorder.
By ... Deputy.

Recorder's Fee $ ...

This Deed should be promptly recorded, as a failure to record it may seriously impair the title to the property.

STATE OF Missouri
County of Camden } ss.

IN THE RECORDER'S OFFICE

I Bill Deberry, Recorder of said County, do hereby certify that the within instrument of writing was, on the 6 day of July A. D. 19 73, at 9 o'clock 00 minutes A. M. duly filed for record in this office, and is recorded in the records of this office in book 175 at page 5

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal at Camdenton this 6 day of July A. D. 19 73

Bill Deberry
Recorder.
By Ila Sorrell Deputy.

FLEET-WAYTE CO., SPRINGFIELD, MO. F-1440

Form 4—Class E

Corporation Warranty Deed

THIS INDENTURE Made on the 13 day of September A. D., One Thousand Nine Hundred and sixtyseven by and between CAMDENTON INDUSTRIAL DEVELOPMENT CORPORATION

a corporation duly organized under the laws of the State of Missouri, of the County of State of , party of the first part, and W. T. Cox Company, Inc., 580 West Highway 54, Camdenton, Missouri

of the County of Camden, State of Missouri, part y of the second part,

WITNESSETH: THAT SAID PARTY OF THE FIRST PART, in consideration of the sum of Ten Dollars and other considerations DOLLARS, to it in hand paid by the said part y of the second part, the receipt of which is hereby acknowledged, does by these presents, GRANT, BARGAIN AND SELL, CONVEY AND CONFIRM, unto the said party of the second part its / successors ~~heirs~~ and assigns, the following described lots, tracts or parcels of land, lying, being and situate in the County of Camden and State of Missouri to-wit: All

All of Tract Twenty-four (24), LAKE DRIVE ADDITION, a Subdivision in Camden County, Missouri according to the plat thereof on file and of record in the Office of The Recorder of Deeds, Camden County, Missouri, EXCEPTING THEREFROM, a parcel heretofore conveyed to the State of Missouri for Missouri U. S. Highway 54.

U.S.R.S. $5.50

BOOK 144 PAGE 181

TO HAVE AND TO HOLD, The premises aforesaid, with all and singular the rights, privileges, appurtenances and immunities thereto belonging or in anywise appertaining, unto the said part y of the second part and unto its successors ~~heirs~~ and assigns forever, the said Camdenton Industrial Development Corporation hereby covenanting that it is lawfully seized of an indefeasible estate in fee in the premises herein conveyed; that it has good right to convey the same; that the said premises are free and clear from any incumbrance done or suffered by it or those under whom it claims; and that it will warrant and defend the title of the said premises unto the said party of the second part and unto its / successors ~~heirs~~ and assigns forever, against the lawful claims and demands of all persons whomsoever.

IN WITNESS WHEREOF, The said party of the first part caused these presents to be signed by its President and attested by its Secretary, and the corporate seal to be hereto attached, the day and year first above written.

(SEAL)

ATTEST: Hugh Phillips, Secretary

CAMDENTON INDUSTRIAL DEVELOPMENT CORPORATION, A Corporation

By Buford Foster, President.

MISSOURI CORPORATION ACKNOWLEDGMENT

STATE OF Missouri } ss.
COUNTY OF Camden }

On this 13 day of September 1967 before me, appeared Buford Foster to me personally known, who being by me duly sworn, did say that he is the President of Camdenton Industrial Development Corporation a corporation, and that the seal affixed to the foregoing instrument is the corporate seal of said corporation and that said instrument was signed and sealed in behalf of said corporation by authority of its Board of Directors, and said Buford Foster acknowledged said instrument to be the free act and deed of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial seal at my office in Camden County Missouri, the day and year last above written.

(SEAL)

My commission expires May 5, 1971

Eileen Allen, Notary Public within and for said County and State.

Filed for record this 13 day of September A. D. 1967, at 3 o'clock 10 minutes P M.

Kaye Adams, Deputy.

Vince Hanlen, Recorder.

Book 182 Page 21

FORM NO. 2 CLASS E

DEMAREE STATIONERY CO., 908 Walnut, Kansas City, Mo.

Missouri Warranty Deed

This Indenture, *Made on the* eighteenth *day of* September *A. D., One Thousand Nine Hundred and* Seventy-four *by and between*

JACK DICKERSON AND ELIZABETH MACHIR DICKERSON, husband and wife

of the County of Camden *, State of* Missouri *part ies of the first part, and*

DICKERSON SUPPLY CO., INC. , a Missouri corporation

of the County of Camden *, State of* Missouri *part Y of the second part.*

(Mailing address of said first named grantee is Camdenton, Missouri 65020 *).*

WITNESSETH: THAT THE SAID PART ies *OF THE FIRST PART, in consideration of the sum of* ----One Dollar and Other Valuable Consideration---------- *DOLLARS to them paid by said part Y of the second part (the receipt of which is hereby acknowledged), do by these presents, Grant, Bargain and Sell, Convey and Confirm unto the said part Y of the second part its heirs and assigns, the following described lots, tracts or parcels of land lying, being and situate in the County of* Camden *and State of Missouri, to-wit:*

All of Tract 24 and Tract 25 in the Lake Drive Addition to the original town of Camdenton, Missouri, according to the plat thereof on file and of record in the office of Recorder of Deeds for said county in Plat Book 2 at Page 10A.

Subject to any easements, reservations, restrictions, and conditions of record.

This instrument is given subject to prior indebtedness recorded in Book 88 Page 945 at the Recorder's Office in Camden County, Missouri.

TO HAVE AND TO HOLD The premises aforesaid with all and singular, the rights, privileges, appurtenances and immunities thereto belonging or in any wise appertaining unto the said part y of the second part and unto its heirs and assigns forever; the said parties of the first part *hereby covenanting that* they *lawfully seized of an indefeasible estate in fee of the premises herein conveyed; that* they *ha ve good right to convey the same; that the said premises are free and clear from any incumbrance done or suffered by* them *or those under whom* they *claim ; and that* they *will warrant and defend the title to the said premises unto the said party of the second part and unto its heirs and assigns forever, against the lawful claims and demands of all persons whomsoever*

IN WITNESS WHEREOF, The said part ies of the first part have hereunto set their *hand s and seal the day and year above written.*

Elizabeth Machir Dickerson (SEAL)

Jack Dickerson (SEAL)

(SEAL)

(SEAL)

MISSOURI ACKNOWLEDGMENT—UNMARRIED PERSON

STATE OF .....
COUNTY OF ..... } ss.

On this ..... day of ..... 19 ....

before me, ..., a Notary Public, personally appeared

.....

to me known to be the person described in and who executed the foregoing instrument, and acknowledged that ..... executed the same as ..... free act and deed. And the said ..... further declare ..... to be single and unmarried.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal at my office in ..... the day and year last above written.

My term expires ....., 19.....

.....
Notary Public in and for said County and State.

MISSOURI ACKNOWLEDGMENT—MAN AND WIFE

STATE OF Missouri
COUNTY OF Camden } ss.

On this ---18th---- day of September, 1974

before me, Natalie Dodd, a Notary Public, personally appeared

Jack Dickerson and Elizabeth Machi Dickerson

to me well known to be the persons described in and who executed the foregoing instrument, and acknowledged that they executed the same as their free act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at my office in Camdenton the day and year last above written.

My term expires 16 June, 19 78

Natalie Dodd Camden-Missouri
Notary Public in and for said County and State.

Book 182 Page 21

Warranty Deed

FROM .....

TO .....

.....

Filed for record this 18 day of September, A.D., 19 74 at 11 o'clock, 35 minutes, A M. and recorded in Book A-182 at Page 21

By Kathy Rutledge Recorder.
Deputy.

Recorder's Fee, $ .....

STATE OF Missouri
COUNTY OF Camden } ss.

IN THE RECORDER'S OFFICE

I, Bill Deberry, Recorder of said County, do hereby certify that the within instrument of writing was at 11 o'clock and 35 minutes A M. on the 18 day of September A. D., 19 74, duly filed for record in my office, and is recorded in the records of this office, in Book 182 at page 21

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal at Camdenton this 18 day of September A. D., 19 74

Bill Deberry Recorder

W. T. Cox Co., Inc.
Camdenton, Missouri

THE FIRST NATIONAL BANK
IN THE HEART OF CAMDENTON
CAMDENTON, MO.

#1506
Filed: ******
February 14, 1969
1:10 P.M.
Camden County, Mo.
BOOK 080 PAGE 931

All machinery, equipment and fixtures and all other items of personal tangible property now owned or hereafter acquired by the debtor.

PURCHASE MONEY

Lot 25 Lake Drive Addition, a Subdivision in Camden County, Missouri.

W. T. Cox Co., Inc.

First National Bank of Elm Creek, Camdenton

W. T. COX CO., INC.
By [illegible]
President

BOOK 080 PAGE 931

February

February

FORM NO. 4—CLASS E Demarce Stationery Co., 918 Walnut, Kansas City, Mo.

BOOK 175 PAGE 545

Corporation Warranty Deed

This Indenture, Made on the 30th day of June A. D., One Thousand Nine Hundred and Seventy-Three by and between

ISC INDUSTRIES INC.

a corporation duly organized under the laws of the State of Delaware, of the County of New Castle, State of Delaware, party of the first part, and

JACK DICKERSON and MACHIR DICKERSON, husband and wife

of the County of Camden, State of Missouri, parties of the second part,

(Mailing address of said first named grantee is P. O. Box 460, Camdenton, Mo. 65020).

WITNESSETH: THAT SAID PARTY OF THE FIRST PART, in consideration of the sum of

$10.00 and other valuable considerations DOLLARS,

to it in hand paid by the said parties of the second part, the receipt of which is hereby acknowledged, does by these presents, GRANT, BARGAIN AND SELL, CONVEY AND CONFIRM, unto the said parties of the second part, their heirs and assigns, the following described lots, tracts or parcels of land, lying, being and situate in the County of Camden and State of Missouri to-wit: All of Tracts 24 and 25 in LAKE DRIVE ADDITION TO THE ORIGINAL TOWN OF CAMDENTON, MISSOURI, according to the plat thereof on file and of record in the Office of the Recorder of Deeds, Camden County, Missouri, subject to all restrictions, reservations, conditions and easements of record and to all existing roads and power lines, whether of record or not.

TO HAVE AND TO HOLD, The premises aforesaid, with all and singular the rights, privileges, appurtenances and immunities thereto belonging or in anywise appertaining, unto the said parties of the second part and unto their heirs and assigns forever, the said

ISC INDUSTRIES INC.

hereby covenanting that it is lawfully seized of an indefeasible estate in fee in the premises herein conveyed; that it has good right to convey the same; that the said premises are free and clear from any incumbrance done or suffered by it or those under whom it claims; and that

ISC INDUSTRIES INC.

will warrant and defend the title of the said premises unto the said parties of the second part and unto their heirs and assigns forever, against the lawful claims and demands of all persons whomsoever.

IN WITNESS WHEREOF, The said party of the first part has caused these presents to be signed by its President and attested by its Secretary, and the corporate seal to be hereto attached, the day and year above written.

ISC INDUSTIRES INC.

By Paul A Stewart
Vice President.

Secretary.

MISSOURI CORPORATION ACKNOWLEDGMENT

STATE OF Missouri } ss.
COUNTY OF Jackson }

On this 28th day of June 19 73

before me, appeared Paul R. Stewart Vice

to me personally known, who being by me duly sworn, did say that he is the President of

ISC INDUSTRIES INC.

a corporation, and that the seal affixed to the foregoing instrument is the corporate seal of said corporation and that said instrument was signed and sealed in behalf of said corporation by authority of its Board of Directors, and said Paul R. Stewart acknowledged said instrument to be the free act and deed of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial seal at my office in Kansas City, Missouri, the day and year last above written.

Roberta J. Witter

My commission expires July 16, 1976 Notary Public within and for said County and State

BOOK 175 PAGE 545

Warranty Deed

FROM

TO

Filed for record this 4 day of August A.D. 1973 at 10 o'clock, 25 minutes, A M.

Recorded in Book at Page

Bill Deberry Recorder.

By Deputy.

Recorder's Fee, $

C. C. Clark

STATE OF Missouri } ss.
COUNTY OF Camden }

IN THE RECORDER'S OFFICE

I, Bill Deberry, Recorder of said County, do hereby certify that the within instrument of writing was, at 10 o'clock and 25 minutes A M., on the 4 day of August A. D., 19 73, duly filed for record in my office, and is recorded in the records of this office, in book 175, at page 545

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal at Camdenton, Mo. this 4 day of August A. D., 1973

Bill Deberry RECORDER

Bettie Sierge

Rules of
Department of Natural Resources
Division 20—Clean Water Commission
Chapter 7—Water Quality

Title		Page
10 CSR 20-7.010	Prevention of Pollution from Wells to Subsurface Waters of the State (Rescinded July 10, 1980)	3
10 CSR 20-7.015	Effluent Regulations	3
10 CSR 20-7.020	Effluent Regulations (Rescinded July 10, 1980)	11
10 CSR 20-7.030	Water Quality Standards (Rescinded December 11, 1977)	11
10 CSR 20-7.031	Water Quality Standards	11
10 CSR 20-7.050	Methodology for Development of Impaired Waters List	130

Title 10—DEPARTMENT OF NATURAL RESOURCES
Division 20—Clean Water Commission
Chapter 7—Water Quality

10 CSR 20-7.010 Prevention of Pollution from Wells to Subsurface Waters of the State

(Rescinded July 10, 1980)

AUTHORITY: section 204.026, RSMo 1978. Original rule filed June 19, 1974, effective June 29, 1974. Amended: Filed April 1, 1975, effective April 11, 1975. Rescinded: Filed Oct. 12, 1979, effective July 10, 1980.

10 CSR 20-7.015 Effluent Regulations

PURPOSE: This rule sets forth the limits for various pollutants which are discharged to the various waters of the state. The two previous rules 10 CSR 20-6.050 and 10 CSR 20-7.010 have been rescinded and this rule combines certain aspects of both rules and modifies the format of the effluent regulations. This rule also complies with the latest changes to the Federal Clean Water Act, P.L. 97-117 (1981).

PUBLISHER'S NOTE: The secretary of state has determined that the publication of the entire text of the material which is incorporated by reference as a portion of this rule would be unduly cumbersome or expensive. This material as incorporated by reference in this rule shall be maintained by the agency at its headquarters and shall be made available to the public for inspection and copying at no more than the actual cost of reproduction. This note applies only to the reference material. The entire text of the rule is printed here.

(1) Designations of Waters of the State.

(A) Definitions.

1. Acute Toxicity Test—a test used to determine the concentration of an effluent that causes an adverse effect (usually death) in a group of test organisms during a short-term exposure.

2. Allowable Effluent Concentration—the concentration of a toxicant or the parameter toxicity in the receiving water after mixing, sometimes referred to as the receiving water concentration or the in-stream waste concentration.

3. Chronic Toxicity Test—A short-term test, usually ninety-six (96) hours or longer in duration, in which sub-lethal effects such as reduced growth or reproduction rates are measured in addition to lethality.

4. Representative sample— a small quantity whose characteristics represent the nature and volume of the whole as described in 40 CFR Part 122.48 September 26, 1984, as published by the Office of the Federal Resister, National Archives and Records Administration, 700 Pennsylvania Avenue, Washington, DC 20408 which is hereby incorporated by reference and does not include later amendments or additions.

5. Toxic Unit—a measure of effluent toxicity generally expressed as acute toxicity unit or chronic toxicity unit. The larger the toxicity unit, the greater the toxicity.

6. Toxic Unit–Acute—one-hundred (100) times the reciprocal of the effluent concentration that causes fifty percent (50%) of the organisms to die in an acute toxicity test.

7. Toxic Unit-Chronic—one-hundred (100) divided by either the highest effluent concentration that causes no observable effect on the test organisms or the inhibition concentration (IC25) causing a twenty-five percent (25%) or more reduction in the reproduction or growth of the test organisms in a chronic toxicity test.

(B) For the purpose of this rule, the waters of the state are divided into the following categories:

1. The Missouri and Mississippi Rivers (section (2) of this rule);

2. Lakes and reservoirs, including natural lakes and any impoundments created by the construction of a dam across any waterway or watershed. An impoundment designed for or used as a disposal site for tailings or sediment from a mine or mill shall be considered a wastewater treatment device and not a lake or reservoir. Releases to lakes and reservoirs include discharges into streams one-half (1/2) stream mile (.80 km) before the stream enters the lake as measured to its conservation pool (section (3) of this rule);

3. A losing stream is a stream which distributes thirty percent (30%) or more of its flow through natural processes such as through permeable geologic materials into a bedrock aquifer within two (2) miles flow distance downstream of an existing or proposed discharge. Flow measurements to determine percentage of water loss must be corrected to approximate the seven (7)-day Q10 stream flow. If a stream bed or drainage way has an intermittent flow or a flow insufficient to measure in accordance with this rule, it may be determined to be a losing stream on the basis of channel development, valley configuration, vegetation development, dye tracing studies, bedrock characteristics, geographical data, and other geological factors. Only discharges which in the opinion of the Missouri Department of Natural Resources (department) reach the losing section and which occur within two (2) miles upstream of the losing section of the stream shall be considered releases to a losing stream. A list of known losing streams is available in the Water Quality Standards, 10 CSR 20-7.031 Table J—Losing Streams. Other streams may be determined to be losing by the department (section (4) of this rule);

4. Metropolitan no-discharge streams. These streams and the limitations on discharging to them are listed in Table F of 10 CSR 20-7.031 Water Quality Standards;

5. Special streams—Outstanding National Resource Waters and Outstanding State Resource Waters, as listed in Tables D and E of 10 CSR 20-7.031 (section (6) of this rule);

6. Subsurface waters in aquifers (section (7) of this rule); and

7. All other waters except as noted in paragraphs (1)(B)1.–6. of this rule (section (8) of this rule).

(C) Sections (2) though (8) of this rule establish requirements for discharges to the waters specified in these sections, and the requirements of section (9) of this rule apply to all discharges. The requirements of this rule do not apply to stormwater discharges; effluent limits for stormwater discharges are prescribed in 10 CSR 20-6.200 Storm Water Regulations.

(2) Effluent Limitations for the Missouri and Mississippi Rivers. In addition to the requirements of section (9) of this rule, the following limitations represent the maximum amount of pollutants which may be discharged from any point source, water contaminant source, or wastewater treatment facility.

(A) Discharges from wastewater treatment facilities which receive primarily domestic waste or from publicly-owned treatment works (POTWs) shall undergo treatment sufficient to conform to the following limitations:

1. Biochemical Oxygen Demand$_5$ (BOD_5) and Total Suspended Solids (TSS) equal to or less than a monthly average of thirty milligrams per liter (30 mg/L) and a weekly average of forty-five milligrams per liter (45 mg/L);

2. pH shall be maintained in the range from six to nine (6–9) standard units in accordance with 40 CFR 133.102 "Secondary Treatment Regulation" October 16, 1984, as published by the Office of the Federal Resister, National Archives and Records Administration, 700 Pennsylvania Avenue, Washington, DC 20408 which is hereby incorporated by reference and does not include later amendments or additions;

3. Exceptions to paragraphs (2)(A)1. and 2. of this rule are as follows:

A. If the facility is a wastewater lagoon, the TSS shall be equal to or less than a monthly average of eighty milligrams per liter (80 mg/L) and a weekly average of one hundred twenty milligrams per liter (120 mg/L) and the pH shall be maintained above six 6.0, and the BOD_5 shall be equal to or less than a monthly average of forty-five milligrams per liter (45 mg/L) and a weekly average of sixty-five milligrams per liter (65 mg/L);

B. If the facility is a trickling filter plant the BOD_5 and TSS shall be equal to or less than a monthly average of forty-five milligrams per liter (45 mg/L) and a weekly average of sixty-five milligrams per liter (65 mg/L);

C. Where the use of effluent limitations set forth in this section is known or expected to produce an effluent that will endanger or violate water quality, the department will set specific effluent limitations for individual dischargers to protect the water quality of the receiving streams;

D. The department may require more stringent limitations than authorized in paragraphs (2)(A)1. and 2. and subparagraphs (2)(A)3.A., B., and C. of this rule under the following conditions:

(I) If the facility is an existing facility, the department may set the BOD_5 and TSS limits based upon an analysis of the past performance, rounded up to the next five milligrams per liter (5 mg/L) range; and

(II) If the facility is a new facility, the department may set the BOD_5 and TSS limits based upon the design capabilities of the plant considering geographical and climatic conditions;

(a) A design capability study has been conducted for new lagoon systems. The study reflects that the effluent limitations should be BOD_5 equal to or less than a monthly average of forty-five milligrams per liter (45 mg/L) and a weekly average of sixty-five milligrams per liter (65 mg/L) and TSS equal to or less than a monthly average of seventy milligrams per liter (70 mg/L) and a weekly average of one hundred ten milligrams per liter (110 mg/L).

(b) A design capability study has been conducted for new trickling filter systems and the study reflects that the effluent limitations should be BOD_5 and TSS equal to or less than a monthly average of forty milligrams per liter (40 mg/L) and a weekly average of sixty milligrams per liter (60 mg/L); and

4. When the wastewater treatment process causes nitrification which affects the BOD_5 reading, the permittee can petition the department to substitute carbonaceous BOD_5 in lieu of regular BOD_5 testing. If the department concurs that nitrification is occurring, the department will set a carbonaceous BOD_5 at five milligrams per liter (5 mg/L) less than the regular BOD_5 in the operating permit.

(B) The suspended solids which are present in stream water and which are removed during treatment may be returned to the same body of water from which they were taken, along with any additional suspended solids resulting from the treatment of water to be used as public potable water or industrial purposes using essentially the same process as a public water treatment process. This includes the solids that are removed from potable waters that are withdrawn from wells located in the alluvial valley of the Missouri and Mississippi Rivers.

(C) Monitoring Requirements.

1. The department will develop a wastewater and sludge sampling program based on design flow and other site-specific factors. Sampling frequency shall not exceed once per day.

A. The department may establish less frequent sampling requirements for point sources that produce an effluent that does not exhibit high variability and consistently complies with the applicable effluent limit; and

B. Sludge sampling will be established in the permit.

2. Unless otherwise specified in the operating permit, sample types shall be:

A. Grab samples for lagoons and recirculating media beds;

B. Twenty-four- (24-) hour composite samples for mechanical plants; and

C. Sludge samples will be grab samples unless otherwise specified in the operating permit.

3. The monitoring frequency and sample types stated in subsection (2)(C) of this rule are minimum requirements.

(3) Effluent Limitations for the Lakes and Reservoirs.

(A) In addition to the requirements of section (9) of this rule, the following limitations represent the maximum amount of pollutants which may be discharged from any point source, water contaminant source, or wastewater treatment facility to a lake or reservoir designated in 10 CSR 20-7.031 as L2 and L3 which is publicly owned. Releases to lakes and reservoirs include discharges into streams one-half (1/2) stream mile (.80 km) before the stream enters the lake as measured to its conservation pool.

1. Discharges from wastewater treatment facilities which receive primarily domestic waste or from POTWs shall undergo treatment sufficient to conform to the following limitations:

A. BOD_5 and TSS equal to or less than a monthly average of twenty milligrams per liter (20 mg/L) and a weekly average of thirty milligrams per liter (30 mg/L);

B. pH shall be maintained in the range from six to nine (6–9) standard units in accordance with 40 CFR 133.102 "Secondary Treatment Regulation" October 16, 1984, as published by the Office of the Federal Resister, National Archives and Records Administration, 700 Pennsylvania Avenue, Washington, DC 20408 which is hereby incorporated by reference and does not include later amendments or additions;

C. Where the use of effluent limitations set forth in section (3) of this rule are reasonably expected to exceed applicable water quality standards, the department may either—conduct waste load allocation studies in order to arrive at a limitation which protects the water quality of the state or set specific effluent limitations for individual dischargers to protect the water quality of the receiving streams; and

D. When the wastewater treatment process causes nitrification which affects the BOD_5 reading, the permittee can petition the department to substitute carbonaceous BOD_5 in lieu of regular BOD_5 testing. If the department concurs that nitrification is occurring, the department will set a carbonaceous BOD_5 at five milligrams per liter (5 mg/L) less than the regular BOD_5 in the operating permit.

(B) Monitoring Requirements.

1. The department will develop a wastewater and sludge sampling program based on design flow and other site-specific factors. Sampling frequency shall not exceed once per day.

A. The department may establish less frequent sampling requirements for point sources that produce an effluent that does not exhibit high variability and consistently complies with the applicable effluent limit; and

B. Sludge sampling will be established in the permit.

2. Unless otherwise specified in the operating permit, sample types shall be:

A. Grab samples for lagoons and recirculating media beds;

B. Twenty-four- (24-) hour composite samples for mechanical plants; and

C. Sludge samples shall be grab samples unless otherwise specified in the operating permit.

3. The monitoring frequency and sample types stated in paragraphs (3)(B)1. through 2. of this rule are minimum requirements.

(C) For lakes designated in 10 CSR 20-7.031 as L1, which are primarily used for public drinking water supplies, there will be

no discharge into the watersheds above these lakes from domestic or industrial wastewater sources regulated by these rules. Discharges from potable water treatment plants, such as filter wash, may be permitted. Separate storm sewers will be permitted, but only for the transmission of storm water. Discharges permitted prior to the effective date of this requirement may continue to discharge so long as the discharge remains in compliance with its operating permit.

(D) For lakes designated in 10 CSR 20-7.031 as L3 which are not publicly owned, the discharge limitations shall be those contained in section (8) of this rule.

(E) In addition to other requirements in this section, discharges to Lake Taneycomo and its tributaries between Table Rock Dam and Power Site Dam (and excluding the discharges from the dams) shall not exceed five tenths milligrams per liter (0.5 mg/L) of phosphorus as a monthly average. Discharges meeting both the following conditions shall be exempt from this requirement:

1. Those permitted prior to May 9, 1994; and

2. Those with design flows of less than twenty-two thousand five hundred (22,500) gpd. The department may allow the construction and operation of interim facilities without phosphorus control provided their discharges are connected to regional treatment facilities with phosphorus control not later than three (3) years after authorization.

(F) In addition to other requirements in this section, discharges to Table Rock Lake watershed, defined as hydrologic units numbered 11010001 and 11010002, shall not exceed five-tenths milligrams per liter (0.5 mg/L) of phosphorus as a monthly average. Discharges meeting both of the following conditions are exempt from this requirement.

1. Those permitted prior to November 30, 1999; and

2. Those with design flows less than twenty-two thousand five hundred (22,500) gpd.

(G) Discharges in the White River basin and outside of the areas identified in (3)(E) and (F) of this section for phosphorus limitations shall be monitored for phosphorus discharges, and the frequency of monitoring shall be the same as that for BOD_5 and TSS, but not less than annually. The department may reduce the frequency of monitoring if the monitoring data is sufficient for water quality planning purposes.

(4) Effluent Limitations for Losing Streams.

(A) Prior to discharging to a losing stream, alternatives such as relocating the discharge to a gaining stream, and connection to a regional wastewater treatment facility must be evaluated and determined to be unacceptable for environmental and/or economic reasons.

(B) In addition to the requirements of section (9) of this rule, each permit for a discharge from a wastewater treatment facility to a losing stream, shall be written using the limitations contained in subsections (4)(B) and (C) of this rule in accordance with any applicable compliance schedule. Discharges from private wastewater treatment facilities which receive primarily domestic waste, industrial sources that treat influents containing significant amounts of organic loading, or POTWs permitted under this section shall undergo treatment sufficient to conform to the following limitations:

1. BOD_5 equal to or less than a monthly average of ten milligrams per liter (10 mg/L) and a weekly average of fifteen milligrams per liter (15 mg/L);

2. TSS equal to or less than a monthly average of fifteen milligrams per liter (15 mg/L) and a weekly average of twenty milligrams per liter (20 mg/L);

3. pH shall be maintained in the range from six to nine (6–9) standard units in accordance with 40 CFR 133.102 "Secondary Treatment Regulation" October 16, 1984, as published by the Office of the Federal Resister, National Archives and Records Administration, 700 Pennsylvania Avenue, Washington, DC 20408 which is hereby incorporated by reference and does not include later amendments or additions;

4. All chlorinated effluent discharges to losing streams or within two (2) stream miles flow distance upstream of a losing stream shall also be dechlorinated prior to discharge;

5. When the wastewater treatment process causes nitrification which affects the BOD_5 reading, the permittee can petition the department to substitute carbonaceous BOD_5 in lieu of regular BOD_5 testing. If the department concurs that nitrification is occurring, the department will set a carbonaceous BOD_5 at five milligrams per liter (5 mg/L) less than the regular BOD_5 in the operating permit; and

6. For situations in which nitrates in a discharge can be reasonably expected to impact specific drinking water wells, the concentration of nitrates in the discharge shall be limited to an average monthly limit of ten milligrams per liter (10 mg/L) as nitrogen and a maximum daily limit of twenty milligrams per liter (20 mg/L). Applicants may conduct a study in the same manner as the Missouri Risk-Based Corrective Action Technical Guidance published in 2006 to determine if nitrate limits are necessary to protect groundwater. In such cases, applicants shall submit a study plan for approval prior to the study, and submit all findings as part of their permit application.

(C) Monitoring Requirements.

1. The department will develop a wastewater and sludge sampling program based on design flow and other site-specific factors. Sampling frequency shall not exceed once per day.

A. The department may establish less frequent sampling requirements for point sources that produce an effluent that does not exhibit high variability and consistently complies with the applicable effluent limit; and

B. Sludge samples will be established in the permit.

2. Unless otherwise specified in the operating permit, sample types shall be:

A. Grab samples for lagoons and recirculating media beds;

B. Twenty-four- (24-) hour composite samples for mechanical plants; and

C. Sludge samples shall be grab samples unless otherwise specified in the operating permit.

3. The monitoring frequency and sample types stated in paragraphs (4)(C)1. through 2. of this rule are minimum requirements.

(5) Effluent Limitations for Metropolitan No-Discharge Streams.

(A) Discharge to metropolitan no-discharge streams is prohibited, except as specifically permitted under the Water Quality Standards 10 CSR 20-7.031 and noncontaminated storm water flows.

(B) Monitoring Requirements.

1. The department will develop a wastewater and sludge sampling program based on design flow and other site-specific factors. Sampling frequency shall not exceed once per day.

A. The department may establish less frequent sampling requirements for point sources that produce an effluent that does not exhibit high variability and consistently complies with the applicable effluent limit; and

B. Sludge sampling will be established in the permit.

2. Unless otherwise specified in the operating permits, sample types shall be:

A. Grab samples for lagoons and recirculating media beds;

B. Twenty-four- (24-) hour composite samples for mechanical plants; and

C. Sludge samples shall be grab samples unless otherwise specified in the operating permit.

3. The monitoring frequency and sample types stated in paragraphs (5)(B)1. through 2. of this rule are minimum requirements.

(6) Effluent Limitations for Special Streams.

(A) Limits for Outstanding National Resource Waters as listed in Table D of 10 CSR 20-7.031 and Drainages Thereto.

1. In addition to the requirements of section (9) of this rule, the following limitations represent the maximum amount of pollutants which may be discharged from any point source, water contaminant source, or wastewater treatment facility to waters included in this section.

2. Discharges from wastewater treatment facilities, which receive primarily domestic waste, or from POTWs are limited as follows:

A. New releases from any source are prohibited;

B. Discharges from sources that existed before June 29, 1974, or if additional stream segments are placed in this section, discharges that were permitted at the time of the designation will be allowed.

3. Industrial, agricultural, and other non-domestic contaminant sources, point sources, or wastewater treatment facilities which are not included under subparagraph (6)(A)2.B. of this rule shall not be allowed to discharge. All precipitation collected in the operational containment area or secondary containment area as well as process generated wastewater shall be stored and disposed of in a no-discharge manner.

4. Monitoring requirements.

A. The department will develop a wastewater and sludge sampling program based on design flow and other site-specific factors. Sampling frequency shall not exceed once per day.

(I) The department may establish less frequent sampling requirements for point sources that produce an effluent that does not exhibit high variability and consistently complies with the applicable effluent limit;

(II) Sludge sampling will be established in the permit.

B. Unless otherwise specified in the operating permit, sample types shall be:

(I) Grab samples for lagoons and recirculating media beds;

(II) Twenty-four- (24-) hour composite samples for mechanical plants; and

(III) Sludge samples shall be grab samples unless otherwise specified in the operating permit.

C. The monitoring frequency and sample types stated in subparagraphs (6)(A)4.A. through B. of this rule are minimum requirements.

(B) Limits for Outstanding State Resource Waters as listed in Table E of 10 CSR 20-7.031.

1. Discharges shall not cause the current water quality in the streams to be lowered.

2. Discharges will be permitted as long as the requirements of paragraph (6)(B)1. of this rule are met and the limitations in section (8) of this rule are not exceeded.

(7) Effluent Limitations for Subsurface Waters.

(A) No person shall release any water into aquifers, store or dispose of water in a way which causes or permits it to enter aquifers either directly or indirectly unless it meets the requirements of section (9) of this rule and it meets the appropriate groundwater protection criteria set in 10 CSR 20-7.031, Table A at a point ten feet (10') under the release point, or other compliance point based on site specific considerations, except as provided in subsection (7)(D) of this rule. The permit writer shall review the complete application and other data to determine which parameter to include in the permit.

(B) No wastewater shall be introduced into sinkholes, caves, fissures, or other openings in the ground which do or are reasonably certain to drain into aquifers except as provided in section (4) of this rule.

(C) All abandoned wells and test holes shall be properly plugged or sealed to prevent pollution of subsurface waters, as per the requirements of the department.

(D) The effluent limitations specified in subsection (7)(A) of this rule shall not apply to facilities designed and constructed to meet department design criteria provided these designs have been reviewed and approved by the department. The department has the right to require monitoring, reporting, public notice, and other information as deemed appropriate. This exemption may be revoked by the department should any monitoring indicate an adverse effect on a beneficial water use or if the numeric criteria in the Water Quality Standards are being exceeded.

(E) Any person not included in subsection (7)(D) of this rule who releases, stores, or disposes of water in a manner which results in releases of water to an aquifer having concentrations in excess of one (1) or more parameter limitations provided in subsection (7)(A) of this rule may be allowed to resample for purposes of verification of the excess. At their discretion, persons may demonstrate, at the direction of the department, that the impact on the water quality in the aquifer is negligible on the beneficial uses. The demonstration shall consider, at a minimum, the following factors:

1. Site geology;
2. Site geohydrology;
3. Existing and potential water uses;
4. Existing surface water and groundwater quality;
5. Characteristics of wastes or wastewater contained in facilities; and
6. Other items as may be required by the department to assess the proposal.

A. Demonstrations conducted under 10 CSR 25-18.010 shall be reviewed by the department in accordance with such rules. If the demonstrations show that the impact on groundwater quality will not result in an unreasonable risk to human health or the environment, alternate effluent limitations will be established by the department.

B. All other demonstrations shall be reviewed by the department. If the demonstrations show that the impact on groundwater quality will not result in an unreasonable risk to human health or the environment, alternate effluent limitation(s) will be proposed by the department and presented to the Clean Water Commission for approval. The Clean Water Commission has the right to require monitoring, reporting, public notice, and other information as deemed appropriate in the approval of the alternate limitation for one (1) or more parameters from subsection (7)(A) of this rule. The Clean Water Commission may hold a public hearing to secure public comment prior to final action on an alternate limitation.

C. No alternate limitations will be granted which would impair beneficial uses of the aquifer or threaten human health or the environment.

D. Alternate limitations may be revoked by the department should any monitoring indicate an adverse effect on a beneficial water use or violations of the alternate limitation.

(8) Effluent Limitations for All Waters, Except Those in Paragraphs (1)(B)1.–6. of This Rule. In addition to the requirements of section (9) of this rule, the following limitations represent the maximum amount of pollutants which may be discharged from any point source, water contaminant source, or wastewater treatment facility.

(A) Discharges from wastewater treatment facilities which receive primarily domestic waste or POTWs shall undergo treatment sufficient to conform to the following limitations:

1. BOD_5 and TSS equal to or less than a monthly average of thirty milligrams per liter (30 mg/L) and a weekly average of forty-five milligrams per liter (45 mg/L);

2. pH shall be maintained in the range from six to nine (6–9) standard units in accordance with 40 CFR 133.102 "Secondary Treatment Regulation" October 16, 1984, as published by the Office of the Federal

Resister, National Archives and Records Administration, 700 Pennsylvania Avenue, Washington, DC 20408 which is hereby incorporated by reference and does not include later amendments or additions;

3. The limitations of paragraphs (8)(A)1. and 2. of this rule will be effective unless an alternate limitation will not cause violations of the Water Quality Standards or impairment of the uses in the standards. When an Antidegradation Review has been completed for new or expanded discharges, the following alternate limitation may also be allowed:

A. If the facility is a wastewater lagoon, the TSS shall be equal to or less than a monthly average of eighty milligrams per liter (80 mg/L) and a weekly average of one hundred twenty milligrams per liter (120 mg/L) and the pH shall be maintained above six (6.0) and the BOD_5 shall be equal to or less than a monthly average of forty-five milligrams per liter (45 mg/L) and a weekly average of sixty-five milligrams per liter (65 mg/L);

B. If the facility is a trickling filter plant, the BOD_5 and TSS shall be equal to or less than a monthly average of forty-five milligrams per liter (45 mg/L) and a weekly average of sixty-five milligrams per liter (65 mg/L);

C. Where the use of effluent limitations set forth in section (8) of this rule is known or expected to produce an effluent that will endanger water quality, the department will set specific effluent limitations for individual dischargers to protect the water quality of the receiving streams; and

D. The department may require more stringent limitations than authorized in paragraphs (8)(A)1. and 2. and subparagraphs (8)(A)3.A., B., and C. of this rule under the following conditions:

(I) If the facility is an existing facility, the department may set the BOD_5 and TSS limits based upon an analysis of the past performance, rounded up to the next five milligrams per liter (5 mg/L) range; and

(II) If the facility is a new facility the department may set the BOD_5 and TSS limits based upon the design capabilities of the plant considering geographical and climatic conditions:

(a) A design capability study has been conducted for new lagoon systems. The study reflects that the effluent limitations should be BOD_5 equal to or less than a monthly average of forty-five milligrams per liter (45 mg/L) and a weekly average of sixty-five milligrams per liter (65 mg/L) and TSS equal to or less than a monthly average of seventy milligrams per liter (70 mg/L) and a weekly average of one hundred ten milligrams per liter (110 mg/L); or

(b) A design capability study has been conducted for new trickling filter systems and the study reflects that the effluent limitations should be BOD_5 and TSS equal to or less than a monthly average of forty milligrams per liter (40 mg/L) and a weekly average of sixty milligrams per liter (60 mg/L); and

4. When the wastewater treatment process causes nitrification which affects the BOD_5 reading, the permittee can petition the department to substitute carbonaceous BOD_5 in lieu of regular BOD_5 testing. If the department concurs that nitrification is occurring, the department will set a carbonaceous BOD_5 at five milligrams per liter (5 mg/L) less than the regular BOD_5 in the operating permit.

(B) Monitoring Requirements.

1. The department will develop a wastewater and sludge sampling program based on design flow and other site-specific factors. Sampling frequency shall not exceed once per day.

A. The department may establish less frequent sampling requirements for point sources that produce an effluent that does not exhibit high variability and consistently complies with the applicable effluent limit; and

B. Sludge sampling will be established in the permit.

2. Unless otherwise specified in the operating permit, sample types shall be:

A. Grab samples for lagoons and recirculating media beds;

B. Twenty-four- (24-) hour composite samples for mechanical plants; and

C. Sludge samples shall be grab samples unless otherwise specified in the operating permit.

3. The monitoring frequency and sample types stated in paragraphs (8)(B)1. through 2. of this rule are minimum requirements.

(9) General Conditions.

(A) Establishing Effluent Limitations. Unless a formal variance from water quality standards have been approved by the Clean Water Commission and the U.S. Environmental Protection Agency, operating permits issued under 10 CSR 20-6.010(7) shall include, if applicable, the most protective limits set forth as follows:

1. Technology-based effluent limits and standards based on specific requirements under sections (2) through (8) of this rule;

2. Water quality-based effluent limits based on a waste load allocation in accordance with federal regulations (40 CFR 122.44(d)(1)), which would address pollutants that have a reasonable potential to cause or contribute to an excursion above Water Quality Standards established in 10 CSR 20-7.031.

A. Local effluent and receiving water data may be used to develop site specific effluent limits provided the department determines that this data is representative and 10 CSR 7.031 provides for their development;

B. Water quality-based effluent limitations incorporating mixing zones and zones of initial dilution as provided for in 10 CSR 20-7.031(5)(A)4.B. may be based on stream flows other than critical low-flow conditions, if the following conditions are met:

(I) The limits are protective of critical low-flow conditions, as well as higher flow conditions; and

(II) The permit shall require in-stream flow measurements and methods to determine compliance;

3. Effluent limit guidelines or standards that have been federally promulgated under Sections 301, 304, 306, 307, 318, and 405 of the Clean Water Act and case-by-case determinations of technology-based effluent limitations under section 402(a)(1) of the Clean Water Act;

4. Effluent limits for discharges subject to a TMDL necessary to achieve water quality standards, including permit limits in lieu of a TMDL. Permit limitations consistent with the requirements and assumptions of an approved waste load allocation within a TMDL shall be placed in permits as needed. Permits may include schedules of compliance and, if developed, follow TMDL implementation plans, adaptive management approaches or other flexibilities so long as they are allowed by federal regulation. The department may reopen existing permits to implement TMDL requirements;

5. Effluent limits that are developed through the antidegradation review process, provided there is reasonable potential to exceed these limits; and

6. Effluent Limits that are required as a result of legal agreements between dischargers and the department or the Clean Water Commission, or as otherwise required or allowed by law.

(B) Bacteria and Statewide Nutrient Limits. Operating Permits as required under 10 CSR 20-6.010(7) shall include, if applicable, the following bacteria and nutrient limits:

1. Bacteria. The following water quality *Escherichia coli (E. coli)* discharge limits apply:

A. Discharges to stream segments designated in Table H of 10 CSR 20-7.031 for whole body contact recreation and secondary contact recreation shall not exceed the water quality *E. coli* counts established in subsection

(5)(C) of 10 CSR 20-7.031;

B. Discharges to lakes designated as whole body contact recreational or secondary contact recreational in Table G of 10 CSR 20-7.031 shall not exceed the water quality *E. coli* counts established in subsection (5)(C) of 10 CSR 20-7.031;

C. Discharges located within two (2) miles upstream of stream segments or lakes designated for whole body contact recreational or secondary contact recreational in Tables H and G of 10 CSR 20-7.031 shall not exceed the water quality *E. coli* counts established in subsection (5)(C) of 10 CSR 20-7.031 for the receiving stream segment or lake designated for those uses;

D. *E. coli* limits. During the recreation season, discharges to waters designated for whole body contact "A" as defined in part (1)(C)2.A.(I) of 10 CSR 20-7.031 shall be limited to one hundred twenty-six (126) colony forming units per one hundred (100) milliliters (ml) expressed as a monthly geometric mean for POTWs and non-POTWs. During the recreation season, discharges to waters designated for whole body contact "B" as defined in part (1)(C)2.A.(II) of 10 CSR 20-7.031 shall be limited to two hundred six (206) colony forming units per one hundred (100) ml expressed as a monthly geometric mean for POTWs and non-POTWs. During the recreation season, discharges to waters designated for secondary contact recreational as defined in subparagraph (1)(C)2.B. of 10 CSR 20-7.031 shall be limited to one thousand one hundred thirty-four (1,134) colony forming units per one hundred (100) ml expressed as a monthly geometric mean for POTWs and non-POTWs. For the entire calendar year, discharges to waters that are defined by paragraph (1)(B)3. of this rule as losing streams shall be limited to one hundred twenty-six (126) colony forming units per one hundred (100) ml expressed as a daily maximum;

E. Short-term *E. coli* limits. Short-term effluent limitations shall be expressed as a daily maximum for non-POTWs and as a weekly geometric mean for POTWs. Short-term effluent limitations for discharges to waters designated for whole body contact "A" and "B" as well as those designated for secondary contact recreation shall be derived by multiplying the monthly geometric mean effluent limitations identified in (9)(B)D. of this rule by a factor of five (5), except that alternative multipliers may be utilized to calculate short-term *E. coli* limitations when proposed and incorporated into permits. At no time shall using alternative multipliers in short-term effluent limitations cause or contribute to an excursion of the in-stream water quality criteria.

F. As an alternative to the limits prescribed in subparagraphs (9)(B)1.A. through E. of this rule, the department may allow permit applicants to conduct a study to develop *E. coli* limits that reflect pathogen decay. Prior to conducting this study applicants shall submit a quality assurance project plan for approval prior to the study, and submit all findings as part of their permit application; and

G. Notwithstanding the bacteria limits prescribed in paragraphs (9)(1)A. through F. of this rule, discharges to losing streams shall be considered in compliance so long as no more than ten (10) percent of samples exceed one hundred twenty-six (126) colony forming units per one hundred (100) ml daily maximum;

2. Nutrients. Reserved for Statewide Nutrient Effluent Limits.

(C) Schedules of Compliance.

1. Compliance with new or revised National Pollutant Discharge Elimination System (NPDES) or Missouri operating permit limitations shall be achieved and in accordance with the federal regulation 40 CFR Part 122.47, "Schedules of Compliance," May 15, 2000, as published by the Office of the Federal Register, National Archives and Records Administration, Superintendent of Documents, Pittsburgh, PA 15250-7954, which is hereby incorporated by reference and does not include later amendments or additions.

2. A compliance schedule may be modified in accordance with the federal regulation 40 CFR 122.62 "Modification or revocation and reissuance of permits," November 20, 2008, as published by the Office of the Federal Resister, National Archives and Records Administration, 700 Pennsylvania Avenue, Washington, DC 20408 which is hereby incorporated by reference and does not include later amendments or additions.

(D) Monitoring, Analysis, and Reporting.

1. All construction and operating permit holders shall submit reports at intervals established by the permit or at any other reasonable intervals required by the department. The monitoring and analytical schedule shall be as established by the department in the operating permit.

2. The analytical and sampling methods used must conform to federal regulation 40 CFR Part 136.3 "Identification of test procedures," August 28, 2017, as published by the Office of the Federal Register, National Archives and Records Administration, 700 Pennsylvania Avenue, Washington, DC 20408 which is hereby incorporated by reference and does not include later amendments or additions.

3. Approval of alternative test procedures shall follow the criteria set forth in federal regulation 40 CFR 136.4 "Application for and approval of alternate test procedures for nationwide use," August 28, 2017, as published by the Office of the Federal Register, National Archives and Records Administration, Washington, DC 20408 or federal regulation 40 CFR 136.5 "Approval of alternate test procedures for limited use," August 28, 2017, as published by the Office of the Federal Register, National Archives and Records Administration, 700 Pennsylvania Avenue, Washington, DC 20408, which are incorporated by reference and do not include later amendments or additions.

4. Sampling and analysis by the department to determine violations of this regulation will be conducted in accordance with the methods listed in paragraph (9)(D)2. of this rule or any other approved by the department. Violations may be also determined by review of the permittee's self-monitoring reports.

5. If, for any reason, the permittee does not comply with or will be unable to comply with any discharge limitations or standards specified in the permit, the permittee shall provide the department with the following information, with the next discharge monitoring report as required under subsection (9)(D) of this rule:

A. A description of the discharge and cause of noncompliance;

B. The period of noncompliance, including exact dates and times and/or the anticipated time when the discharge will return to compliance; and

C. The steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

6. In the case of any discharge subject to any applicable toxic pollutant effluent standard under Section 307(a) of the federal Clean Water Act, the information required by paragraph (9)(D)5. of this rule regarding a violation of this standard shall be provided within twenty-four (24) hours from the time the owner or operator of the water contaminant source, point source, or wastewater treatment facility becomes aware of the violation or potential violation. This information may be provided via an electronic web-based system developed by the department, provided it is available. If this information is provided orally, a written submission covering these points shall be provided within five (5) working days of the time the owner or operator of the water contaminant source, point source, or wastewater treatment facility becomes aware of the violation.

7. Bacteria Monitoring for Disinfection.

A. For systems that have a design capacity of greater than one hundred thousand (100,000) gpd, a minimum of one (1) sample shall be collected for *E. coli* analysis each calendar week during the recreational season from April 1 through October 31. Compliance with the *E. coli* water quality standard established in subsection (5)(C) of 10 CSR 20-7.031 shall be determined each calendar month by calculating the geometric mean of all of the samples collected each calendar month. Compliance with the short-term *E. coli* limits established in subparagraph (9)(B)1.E. of this rule shall also be determined.

B. For systems that discharge to stream segments that are defined by paragraph (1)(B)3. as losing streams and have a design capacity of greater than one hundred thousand (100,000) gpd, a minimum of one (1) sample shall be collected for *E. coli* analysis each calendar week all year. Compliance with the *E. coli* water quality standard established in subsection (5)(C) of 10 CSR 20-7.031 and with the short term *E. coli* limits established in subparagraph (9)(B)1.E. of this rule shall also be determined.

C. For systems that have a design capacity of one hundred thousand (100,000) gpd or less, the sampling frequency for *E. coli* analysis shall be in accordance with the wastewater and sludge sampling program based on the design flow which is dependent upon the receiving water category as listed in subsection (1)(B) of this rule. Compliance with the *E. coli* water quality standard established in subsection (5)(C) of 10 CSR 20-7.031 shall be determined each calendar month by calculating the geometric mean of all of the samples collected each calendar month. Compliance with the short-term *E. coli* limits established in subparagraph (9)(B)1.E. of this rule shall also be determined.

8. Statewide Monitoring for Nutrients. Point sources that have the design capacity of greater than one hundred thousand (100,000) gpd that typically discharge nitrogen and phosphorus shall collect and analyze influent and effluent samples for total phosphorus, ammonia, total kjeldahl nitrogen and nitrate plus nitrite utilizing methods outlined in (D)2. of this section using the following frequencies:

A. Quarterly for facilities with design capacities greater than one hundred thousand (100,000) gpd and less than one million (1,000,000) gpd per day for a period up to five (5) years. The department may require additional monitoring to ascertain a discharge's nutrient contribution and the efficacy of the treatment technology as it pertains to nutrient removal.

B. Monthly for facilities with design capacities greater than or equal to one million (1,000,000) gpd for a period up to five (5) years. The department may require additional monitoring to ascertain a discharge's nutrient contribution and the efficacy of the treatment technology as it pertains to nutrient removal.

C. The department may impose ongoing or more frequent monitoring in permits that impose effluent limits for total nitrogen or total phosphorus or in situations in which monitoring is appropriate to ensure compliance with water quality standards or specific lake limits specified under subsection (3)(E) and (F) of this rule.

(E) Dilution Water. Dilution of treated wastewater with cooling water or other less contaminated water to lower the effluent concentration to limits required by an effluent regulation of the Clean Water Law shall not be an acceptable means of treatment.

(F) Compliance with New Source Performance Standards.

1. Except as provided in paragraph (9)(F)2. of this rule, any new water contaminant source, point source, or wastewater treatment facility on which construction commenced after October 18, 1972, or any new source, which meets the applicable promulgated new source performance standards before the commencement of discharge, shall not be subject to any more stringent new source performance standards or to any more stringent technology-based standards under subsection 301(b)(2) of the federal Clean Water Act for the shortest of the following periods:

A. Ten (10) years from the date that construction is completed;

B. Ten (10) years from the date the source begins to discharge process or other nonconstruction related wastewater; or

C. The period of depreciation or amortization of the facility for the purposes of section 167 or 169 (or both) of the *Internal Revenue Code* of 1954.

2. The protection from more stringent standards of performance afforded by paragraph (9)(F)1. of this rule does not apply to—

A. Additional or more stringent permit conditions which are not technology based, for example, conditions based on water quality standards or effluent standards or prohibitions under Section 307(a) of the federal Clean Water Act; and

B. Additional permit conditions controlling pollutants listed as toxic under Section 307(a) of the federal Clean Water Act or as hazardous substances under Section 311 of the federal Clean Water Act and which are not controlled by new source performance standards. This exclusion includes permit conditions controlling pollutants other than those identified as hazardous where control of those other pollutants has been specifically identified as the method to control the hazardous pollutant.

(G) Bypass. Bypass means the intentional diversion of waste streams from any portion of a treatment facility, except in the case of blending. Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. Blending is the practice of diverting wet-weather flows around any treatment unit and recombining those flows within the treatment facility, while providing primary and secondary or biological treatment up to the available capacity, consistent with all applicable effluent limits and conditions. Stipulations regarding bypass allowances, prohibitions and reporting requirements shall comply with federal regulation 40 CFR 122.41 "Conditions applicable to all permits (applicable to state programs, See section 123.25), October 22, 2015, as published by the Office of the Federal Register, National Archives and Records Administration, 700 Pennsylvania Avenue, Washington, DC 20408, which are incorporated by reference and do not include later amendments or additions.

(H) Sludge facilities shall meet the applicable control technology for sewage sludge treatment, use, and disposal as published by the EPA in 40 CFR 503 and applicable state standards and limitations published in 10 CSR 20 and 10 CSR 80. Where there are no standards available or applicable, or when more stringent standards are appropriate to protect human health and the environment, the department shall set specific limitations in permits on a case-by-case basis using best professional judgment.

(I) Industrial, agricultural, and other nondomestic water contaminant sources, point sources, or wastewater treatment facilities which are not included under subsections (2)(A) or (8)(A) of this rule—

1. These facilities shall meet the applicable control technology currently effective as published by the EPA in 40 CFR 405–471. Where there are no standards available or applicable, the department shall set specific parameter limitations using best professional judgment. The pH shall be maintained in the range from six to nine (6–9) standard units, except that discharges of uncontaminated cooling water and water treatment plant effluent

may exceed nine (9) standard units, but may not exceed ten and one-half (10.5) standard units, if it can be demonstrated that the pH will not exceed nine (9) standard units beyond the regulatory mixing zone; and

2. All precipitation collected in the operational containment area or secondary containment area as well as process generated wastewater shall be stored and disposed of in a no-discharge manner or treated to meet the applicable control technology referenced in paragraph (9)(I)1. of this rule.

(J) Implementation Schedule for Protection of Whole Body Contact and Secondary Contact Recreation.

1. For discharges to water bodies designated for whole body contact and secondary contact recreational use prior to July 1, 2012, in 10 CSR 20-7.031, permits shall insure compliance with effluent limits to protect whole body contact and secondary contact recreation by no later than December 31, 2013, unless the permittee presents an evaluation sufficient to show that disinfection is not required to protect one (1) or both designated recreational uses, or a UAA demonstrates that one (1) or both designated recreational uses are not attainable in the classified waters receiving the effluent.

2. For discharges to water bodies designated for whole body contact and secondary contact recreational use after June 30, 2012, in 10 CSR 20-7.031, permits shall include schedules of compliance to meet bacteria limits in accordance with subsection (9)(C) of this rule.

(K) Temporary Suspension of Accountability for Bacteria Standards during Wet Weather. The accountability for bacteria standards may be temporarily suspended for specific discharges when conditions contained in paragraphs (9)(K)1. through 3. of this rule are met.

1. No existing recreational uses downstream of the discharge will be impacted during the period of suspension as confirmed through a water quality review for reasonable potential for downstream impacts and a UAA performed in accordance with the *Missouri Recreational Use Attainability Analysis Protocol* approved by the Missouri Clean Water Commission.

2. The period of suspension must be restricted to the defined wet weather event that corresponds to the period when recreational uses are unattainable. The period must be determinable at any time by the discharger and the general public (such as from stream depth or flow readings or other stream conditions on which publicly accessible records are kept).

3. The suspension shall be subject to public review and comment, Missouri Clean Water Commission approval, and EPA approval before becoming effective and shall be contained as a condition in a discharge permit or other written document developed through public participation.

(L) Whole Effluent Toxicity (WET) Test. The following are permit requirements for acute and chronic WET tests:

1. WET tests are to be conducted according to the methods prescribed in 40 CFR 136.3;

2. Test Types.

A. Acute WET tests shall be a multiple dilution series, static, non-renewal test to determine the degree at which acute forty-eight to ninety-six hour (48–96 hour) exposure to the effluent is acutely toxic to aquatic life expressed in species survival.

B. Chronic WET test shall be a multiple dilution series, static, renewal test to determine the degree at which chronic (sub lethal) exposure to the effluent is toxic to aquatic life or affects an alternative endpoint such as species reproduction and/or growth. Duration of chronic WET tests shall be established according to 40 CFR 136.3 Identification of test procedures, promulgated as of July 1, 2011, is hereby incorporated by reference in this rule, as published by the Office of the Federal Register, U.S. National Archives and Records, 700 Pennsylvania Avenue NW, Washington, DC 20408. This rule does not incorporate any subsequent amendments or additions;

3. Applicability. WET test type and frequency shall be determined and expressed in permits by the department. At permit issuance or reissuance, the department will use valid and representative data to establish on a case-by-case basis, whether an existing discharge causes, has the reasonable potential to cause, or contributes to an excursion from the narrative water quality criteria. Where the department concludes that a discharge has the reasonable potential to contribute to an excursion from the narrative water quality criteria, as established in 10 CSR 20- 7.031 the permit will include WET limits. If the department determines the facility has no reasonable potential to violate water quality standards, WET testing may be removed, or if more information is required, WET testing may be retained at a reduced frequency. WET test applicability for NPDES permits shall be fully addressed in the permit factsheet; and

4. Specifications.

A. A dilution series shall be established in the permit for WET test. The dilution series shall be a set of proportional effluent dilutions based on an Allowable Effluent Concentration (AEC).

B. All WET tests shall be performed with *Pimephales promelas* (a fathead minnow) and *Ceriodaphnia dubia* (a water flea), except facilities which discharge to receiving streams designated as cold-water fisheries. Facilities which discharge to receiving streams designated as cold-water fisheries may be required to perform WET tests using *Oncorhynchus mykiss* (rainbow trout) instead of the fathead minnow. Other test species for which test methods are provided in 40 CFR 136.3 may be approved by the department on a case-by-case basis provided the species are appropriately sensitive and representative. Alternative species (not included in 40 CFR 136.3) shall be approved in accordance with the procedures in 40 CFR 136.4. Application for alternate test procedures, promulgated as of August 28, 2017, is hereby incorporated by reference in this rule, as published by the Office of the Federal Register, U.S. National Archives and Records, 700 Pennsylvania Avenue NW, Washington, DC 20408. This rule does not incorporate any subsequent amendments or additions.

C. A Toxic Unit (TU) water quality based limit shall be established in the permit for WET test where the department concludes that a discharge has the reasonable potential to cause or contribute to an excursion from the narrative water quality criteria as established in 10 CSR 20-7.031(4)(D). The TU limit shall be determined in accordance with 40 CFR 122.44(d)(1)(v) and utilizing the methods established in Technical Support Document For Water Quality-based Toxics Control (March 1991, EPA, EPA/505/2-90-001) and documented in the factsheet. Exceedance of a TU limit shall be a WET test failure.

D. Upon completion of a WET test the lab report and department form as referenced in the permit shall be submitted by the permittee to the department within the timeframe established by the permit.

(10) Control of Combined Sewer Overflows (CSOs). The permitting and control of CSOs shall conform to EPA's CSO Control Policy, EPA Number 830/B-94-001 (published by EPA April 19, 1994, at 59 Fed. Reg. 18688) as referenced by Section 402 (q) of the Clean Water Act, 33 USC 1342(q). The CSO Control Policy is hereby incorporated by reference, without any later amendments or additions. This document is available by writing to U.S. Environmental Protection Agency, Office of Water Resource Center, Mail Code RC-4100T, 1200 Pennsylvania Avenue NW, Washington, DC 20460 or upon request from the Department of Natural Resources, Water Protection Program, Water Pollution Control

Branch, PO Box 176, Jefferson City, MO 65102-0176. Effluent monitoring commitments for CSOs shall be addressed in the long term control plans required under EPA's CSO Control Policy.

AUTHORITY: section 644.026, RSMo 2016. Original rule filed June 6, 1974, effective June 16, 1974. Amended: Filed April 1, 1975, effective April 11, 1975. Rescinded: Filed Oct. 16, 1979, effective July 11, 1980. Readopted: Filed Feb. 4, 1980, effective July 11, 1980. Rescinded and readopted: Filed Nov. 10, 1982, effective May 12, 1983. Amended: Filed Sept. 11, 1984, effective March 12, 1985. Amended: Filed July 25, 1985, effective Dec. 26, 1985. Amended: Filed Feb. 1, 1988, effective June 13, 1988. Amended: Filed Sept. 13, 1988, effective Feb. 14, 1989. Amended: Filed July 15, 1991, effective Jan. 13, 1992. Amended: Filed Sept. 2, 1993, effective May 9, 1994. Amended: Filed March 1, 1999, effective Nov. 30, 1999. Amended: Filed Dec. 30, 1999, effective Sept. 30, 2000. Amended: Filed March 31, 2005, effective Dec. 31, 2005. Amended: Filed Sept. 28, 2009, effective June 30, 2010. Amended: Filed May 15, 2013, effective Feb. 28, 2014. Amended: Filed June 15, 2018, effective Feb. 28, 2019.*

**Original authority: 644.026, RSMo 1972, amended 1973, 1987, 1993, 1995, 2000, 2012, 2014.*

10 CSR 20-7.020 Effluent Regulations
(Rescinded July 10, 1980)

AUTHORITY: section 204.026, RSMo 1978. Original rule filed June 6, 1974, effective June 16, 1974. Amended: Filed April 1, 1975, effective April 11, 1975. Rescinded: Filed Oct. 12, 1979, effective July 10, 1980.

10 CSR 20-7.030 Water Quality Standards
(Rescinded December 11, 1977)

AUTHORITY: sections 204.021 and 204.026, RSMo Supp. 1973. Rescinded: effective Dec. 11, 1977.

10 CSR 20-7.031 Water Quality Standards

PURPOSE: This rule identifies uses of waters of the state, criteria to protect those uses, and defines the antidegradation policy. It is developed in response to the Missouri Clean Water Law and the federal Clean Water Act, Section 303(c)(1) and (2), which requires that state water quality standards be reviewed at least once every three (3) years. These revisions are pursuant to the national goal of protection of fish, shellfish, and wildlife and recreation in and on the water as outlined in Section 101(a)(2) of the Act.

PUBLISHER'S NOTE: The secretary of state has determined that the publication of the entire text of the material which is incorporated by reference as a portion of this rule would be unduly cumbersome or expensive. This material as incorporated by reference in this rule shall be maintained by the agency at its headquarters and shall be made available to the public for inspection and copying at no more than the actual cost of reproduction. This note applies only to the reference material. The entire text of the rule is printed here.

(1) Definitions.

(A) Acute toxicity—Conditions producing adverse effects or lethality on aquatic life following short-term exposure. The acute criteria in Tables A1, A2, and B1 are maximum concentrations which protect against acutely toxic conditions. Acute toxicity is also indicated by exceedence of whole-effluent toxicity (WET) test conditions of paragraph (4)(I)2. For substances not listed in Tables A1, A2, and B1, three-tenths (0.3) of the median lethal concentration, or the no observed acute effect concentration for representative species, may be used to determine absence of acute toxicity.

(B) Aquifer—A subsurface water-bearing bed or stratum which stores or transmits water in recoverable quantities that is currently being used or could be used as a water source for private or public use. It does not include water in the vadose zone.

(C) Designated uses—Uses specified for each water body whether or not they are being attained. Uses are designated according to section (2) of this rule and include, but are not limited to—

1. Protection and propagation of fish, shellfish, and wildlife. Streams will be designated to one (1) of the following aquatic habitat protection uses based on watershed size, scale within the stream network, and other hydrological and physical data. Lakes and reservoirs will be designated to one (1) of the following aquatic habitat protection uses based on limnological characteristics (such as temperature) and biological assemblages.

A. Warm Water Habitat (WWH)—Waters in which naturally-occurring water quality and habitat conditions allow the maintenance of a wide variety of warm-water biota.

(I) Great River
(II) Large River
(III) Small River
(IV) Creek
(V) Headwater
(VI) Lake or reservoir

B. Cool Water Habitat (CLH)—Waters in which naturally-occurring water quality and habitat conditions allow the maintenance of a wide variety of cool-water biota. These waters can support a sensitive, high-quality sport fishery (i.e., smallmouth bass and rock bass).

(I) Large River
(II) Small River
(III) Creek
(IV) Headwater
(V) Lake or reservoir

C. Cold Water Habitat (CDH)—Waters in which naturally-occurring water quality and habitat conditions allow the maintenance of a wide variety of cold-water biota. These waters can support a naturally reproducing or stocked trout fishery and populations of other cold-water species.

(I) Large River
(II) Small River
(III) Creek
(IV) Headwater
(V) Lake or reservoir

D. Ephemeral Aquatic Habitat (EAH)—Waters having surface flow or pools in response to precipitation events or snow melt, but without permanent surface flow or permanent pools; naturally-occurring water quality and habitat conditions may allow the maintenance of a limited or transient community of aquatic biota.

E. Modified Aquatic Habitat (MAH)—Waters in which natural habitat conditions have been physically, chemically, or biologically modified; habitat and resulting water quality conditions may prevent the maintenance of a wide variety or diversity of aquatic biota.

F. Limited Aquatic Habitat (LAH)—Waters in which natural habitat conditions have been substantially and irretrievably altered; habitat and resulting water quality conditions do not allow maintenance of aquatic biota, or if present, the community is of poor variety or diversity;

2. Recreation in and on the water. Assignment of these uses does not grant an individual the right to trespass.

A. Whole body contact recreation (WBC)—Activities involving direct human contact with waters of the state to the point of complete body submergence. The water may be ingested accidentally and certain sensitive body organs, such as the eyes, ears, and the nose, will be exposed to the water. Although the water may be ingested accidentally, it is not intended to be used as a potable supply unless acceptable treatment is applied. Waters

so designated are intended to be used for swimming, water skiing, or skin diving.

(I) Category A (WBC-A)—This category applies to waters that have been established by the property owner as public swimming areas welcoming access by the public for swimming purposes and waters with documented existing whole body contact recreational use(s) by the public. Examples of this category include, but are not limited to: public swimming beaches and property where whole body contact recreational activity is open to and accessible by the public through law or written permission of the landowner.

(II) Category B (WBC-B)—This category applies to waters designated for whole body contact recreation not contained within category A.

B. Secondary contact recreation (SCR)—Uses include fishing, wading, commercial and recreational boating, any limited contact incidental to shoreline activities, and activities in which users do not swim or float in the water. These recreational activities may result in contact with the water that is either incidental or accidental and the probability of ingesting appreciable quantities of water is minimal;

3. Human health protection (HHP)—Criteria to protect this use are based on the assumption of an average amount of fish consumed on a long-term basis. Protection of this use includes compliance with Food and Drug Administration (FDA) limits for fish tissue, maximum water concentrations corresponding to the 10^{-6} cancer risk level, and other human health fish consumption criteria;

4. Irrigation (IRR)—Application of water to cropland or directly to cultivated plants that may be used for human or livestock consumption. Occasional supplemental irrigation, rather than continuous irrigation, is assumed;

5. Livestock and wildlife protection (LWP)—Maintenance of conditions in waters to support health in livestock and wildlife;

6. Drinking water supply (DWS)—Maintenance of a raw water supply which will yield potable water after treatment by public water treatment facilities;

7. Industrial water supply (IND)—Water to support various industrial uses; since quality needs will vary by industry, no specific criteria are set in these standards;

8. Storm- and flood-water storage and attenuation (WSA)—Wetlands and other waters which serve as overflow and storage areas during flood or storm events slowly release water to downstream areas, thus lowering flood peaks and associated damage to life and property;

9. Habitat for resident and migratory wildlife species, including rare and endangered species (WHP)—Wetlands and other waters that provide essential breeding, nesting, feeding, and predator escape habitats for wildlife including waterfowl, birds, mammals, fish, amphibians, and reptiles;

10. Recreational, cultural, educational, scientific, and natural aesthetic values and uses (WRC)—Wetlands and other waters that serve as recreational sites for fishing, hunting, and observing wildlife; waters of historic or archaeological significance; waters which provide great diversity for nature observation, educational opportunities, and scientific study; and

11. Hydrologic cycle maintenance (WHC)—Wetlands and other waters hydrologically connected to rivers and streams serve to maintain flow conditions during periods of drought. Waters that are connected hydrologically to the groundwater system recharge groundwater supplies and assume an important local or regional role in maintaining groundwater levels.

(D) Biocriteria—Numeric values or narrative expressions that describe the reference biological integrity of aquatic communities inhabiting waters that have been designated for aquatic-life protection.

(E) Chronic toxicity—Conditions producing adverse effects on aquatic life or wildlife following long-term exposure but having no readily observable effect over a short time period. Chronic numeric criteria in Tables A1, A2, B2, and B3 are maximum concentrations which protect against chronic toxicity; these values shall be considered four- (4-) day averages, with the exception of total ammonia as nitrogen which shall be considered a thirty- (30-) day average. Chronic toxicity is also indicated by exceedence of WET test conditions of subsection (5)(Q). For substances not listed in Tables A1, A2, B2, and B3, commonly used endpoints such as the no-observed effect concentration or inhibition concentration of representative species may be used to demonstrate absence of toxicity.

(F) Class—All waters listed in the Missouri Use Designation Dataset and in Table G and Table H of this rule shall have a hydrologic class. During normal flow periods, some rivers back water into tributaries which do not otherwise have a hydrologic class. These permanent backwater areas are considered to have the same hydrologic class as the water body into which the tributary flows.

1. Class L1—Lakes used primarily for public drinking water supply.

2. Class L2—Major reservoirs.

3. Class L3—Other lakes which are waters of the state. These include both public and private lakes. For effluent regulation purposes, publicly-owned L3 lakes are those for which a substantial portion of the surrounding lands are publicly owned or managed.

4. Class P—Streams that maintain permanent flow even in drought periods.

5. Class P1—Standing-water reaches of Class P streams.

6. Class C—Streams that may cease flow in dry periods but maintain permanent pools which support aquatic life.

7. Class E—Streams that do not maintain permanent surface flow or permanent pools, but have ephemeral surface flow or pools in response to precipitation events.

8. Class W—Wetlands that are waters of the state that meet the criteria in the *Corps of Engineers Wetlands Delineation Manual* (January 1987), and subsequent federal revisions and supplements. Class W waters do not include wetlands that are artificially created on dry land and maintained for the treatment of mine drainage, stormwater control, drainage associated with road construction, or industrial, municipal, or agricultural waste.

(G) Early life stages of fish—The pre-hatch embryonic period, the post-hatch free embryo or yolk-sac fry, and the larval period during which the organism feeds. Juvenile fish, which are anatomically rather similar to adults, are not considered an early life stage.

(H) Ecoregion—Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. By recognizing the spatial differences in the capacities and potentials of ecosystems, ecoregions stratify the environment by its probable response to disturbance (Bryce, Omernik, and Larsen, 1999).

(I) Epilimnion—Zone of atmospheric mixing in a thermostratified lake.

(J) *Escherichia coli* (*E. coli*)—A type of fecal coliform bacteria found in the intestines of animals and humans. The presence of *E. coli* in water is a strong indication of recent sewage or animal waste contamination. Sewage may contain many types of disease-causing organisms (pathogens).

(K) Eutrophication—The process by which a body of water becomes enriched in dissolved nutrients, such as nitrogen and phosphorus, that stimulate the excessive growth of algae and other plants. Eutrophication may be accelerated by human activities.

(L) Existing uses—Those uses actually attained in the water body on or after November 28, 1975, whether or not they are identified in the water quality standards.

(M) Hypolimnion—Zone beneath the zone of atmospheric mixing in a thermostratified lake.

(N) Lethal concentration$_{50}$ (LC_{50})—Concentration of a toxicant which would be expected to kill fifty percent (50%) of the individuals of the test species organisms in a test of specified length of time.

(O) Losing stream—A stream which distributes thirty percent (30%) or more of its flow during low flow conditions through natural processes, such as through permeable geologic materials into a bedrock aquifer within two (2) miles flow distance downstream of an existing or proposed discharge. Flow measurements to determine percentage of water loss must be corrected to approximate the 7Q10 stream flow. If a stream bed or drainage way has an intermittent flow or a flow insufficient to measure in accordance with this rule, it may be determined to be a losing stream on the basis of channel development, valley configuration, vegetation development, dye tracing studies, bedrock characteristics, geographical data, and other geological factors. Losing streams are identified in the digital geospatial dataset 'LOSING_STREAM' developed by the Missouri Department of Natural Resources, Missouri Geological Survey; additional streams may be determined to be losing by the Missouri Department of Natural Resources.

(P) Low-flow conditions—Where used in this regulation in the context of mixing zones, the low-flow conditions shall refer to the minimum amount of stream flow occurring immediately upstream of a wastewater discharge and available, in whole or in part, for attenuation of wastewater pollutants.

1. Seven- (7-) day, one- (1-) in-ten- (10-) year low flow (7Q10)—The lowest average flow for seven (7) consecutive days that has a probable recurrence interval of once-in-ten (10) years.

2. Sixty- (60-) day, one- (1-) in-two- (2-) year low flow (60Q2)—The lowest average flow for sixty (60) consecutive days that has a probable recurrence interval of once-in-two (2) years.

3. Thirty- (30-) day, one- (1-) in-ten- (10-) year low flow (30Q10)—The lowest average flow for thirty (30) consecutive days that has a probable recurrence interval of once-in-ten (10) years.

4. One- (1-) day, one- (1-) in-ten- (10-) year low flow (1Q10)—The lowest average flow for one (1) day that has a probable recurrence interval of once-in-ten (10) years.

(Q) Missouri Use Designation Dataset—A digital geospatial dataset used in conjunction with geographic information systems and maintained by the department. This dataset documents the names and locations of the state's rivers, streams, lakes, and reservoirs which have been assigned designated uses. The initial version of this dataset, as adopted on November 6, 2013, reflects Tables G and H plus any additional presumptive uses described in section (2). The dataset will also include information regarding both pending and approved determinations, variances, use attainability analyses, and water quality standards revisions. The dataset uses the geospatial framework provided by the National Hydrography Dataset and is enhanced and supported by hydrological and physical information obtained through the Missouri Resource Assessment Partnership (MoRAP) and other scientific sources. The dataset is limited in geographic extent to the state of Missouri.

(R) Mixing zone—An area of dilution of effluent in the receiving water beyond which chronic toxicity criteria must be met.

(S) National Hydrography Dataset (NHD)—A digital vector dataset used in conjunction with geographic information systems to describe the location of rivers, streams, lakes, reservoirs, and other surface water features. As applied in this rule, the term refers to the 1:100,000 scale dataset generated by the United States Geological Survey. This dataset provides the geospatial framework for the Missouri Use Designation Dataset.

(T) Outstanding national resource waters—Waters which have outstanding national recreational and ecological significance. These waters shall receive special protection against any degradation in quality. Congressionally-designated rivers, including those in the Ozark national scenic riverways and the wild and scenic rivers system, are so designated (see Table D).

(U) Outstanding state resource waters—High quality waters with a significant aesthetic, recreational, or scientific value which are specifically designated as such by the Clean Water Commission (see Table E).

(V) Ozark streams—Streams lying within the Ozark faunal region as described in the *Aquatic Community Classification System for Missouri*, 1989, Aquatic Series No. 19, Missouri Department of Conservation, Jefferson City, MO 65109, which is hereby incorporated by reference and does not include any later amendments or additions. The department shall maintain a copy of the referenced documents and shall make them available to the public for inspection and copying at no more than the actual cost of reproduction.

(W) Reference lakes or reservoirs—Lakes or reservoirs determined by Missouri Department of Natural Resources to be the best available representatives of ecoregion waters in a natural condition with respect to habitat, water quality, biological integrity and diversity, watershed land use, and riparian conditions.

(X) Reference stream reaches—Stream reaches determined by the department to be the best available representatives of ecoregion waters in a natural condition, with respect to habitat, water quality, biological integrity and diversity, watershed land use, and riparian conditions.

(Y) Regulated-flow streams—A stream that derives a majority of its flow from an impounded area with a flow-regulating device.

(Z) Use Attainability Analysis (UAA)—A structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors as described in 40 CFR 131.10(g).

(AA) Variance—A temporary modification to 10 CSR 20-7.031 that is deemed necessary in accordance with section (12) of this rule.

(BB) Water effect ratio—Appropriate measure of the toxicity of a material obtained in a site water divided by the same measure of the toxicity of the same material obtained simultaneously in a laboratory dilution water.

(CC) Water hardness—The total concentration of calcium and magnesium ions expressed as calcium carbonate. For purposes of this rule, hardness will be the median value of a representative number of samples from the water in question or from similar waters at the appropriate stream flow conditions within the same ecoregion.

(DD) Water quality criteria—Chemical, physical, and biological properties of water that are necessary to protect beneficial water uses.

(EE) Waters of the state—As defined in section 644.016, RSMo.

(FF) Wetlands—Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. This definition is consistent with both the United States Army Corps of Engineers wetlands definition at 33 CFR 328.3(b) and the United States Environmental Protection Agency wetlands definition at 40 CFR 232.2(r).

(GG) Whole effluent toxicity tests—A toxicity test conducted under specified laboratory conditions on specific indicator organisms. To estimate chronic and acute toxicity of the effluent in its receiving stream, the effluent may be diluted to simulate the computed percent effluent at the edge of the mixing zone or

zone of initial dilution.

(HH) Zone of initial dilution—A small area of initial mixing below an effluent outfall beyond which acute toxicity criteria must be met.

(II) Zone of passage—A continuous water route necessary to allow passage of organisms with no acutely toxic effects produced on their populations.

(JJ) Other definitions as set forth in the Missouri Clean Water Law and 10 CSR 20-2.010 shall apply to terms used in this rule.

(2) Designation of Uses.

(A) Rebuttable presumption. Consistent with the presumptive beneficial use protections described by 40 CFR Part 131 and section 101(a)(2) of the federal Clean Water Act—

1. All perennial rivers and streams;

2. All streams with permanent pools;

3. All rivers and streams included within the 1:100,000 scale National Hydrography Dataset (NHD) described in subsection (1)(R) of this rule; and

4. All lakes and reservoirs that intersect the flow lines of rivers and streams identified in paragraph (2)(A)3. of this rule, shall be presumed to support the following designated uses: Aquatic habitat protection; Human health protection; Whole body contact recreation – Category B; and Secondary contact recreation, as defined in this rule. This presumption is rebuttable subject to demonstration based on use attainability analyses as described in subsection (2)(F) of this rule.

(B) Presumed Uses. All waters described in subsection (2)(A) shall also be assigned Livestock and wildlife protection and Irrigation designated uses, as defined in this rule.

(C) Other Uses. Use designations other than those mentioned in subsections (2)(A) and (2)(B) of this rule may be applied to waters identified in subsection (2)(A), Table G and Table H of this rule on a site-specific, case-by-case basis following approval by the Clean Water Commission and U.S. Environmental Protection Agency.

(D) Use Designation. Uses of waters shall be designated as follows—

1. Designated uses applied to individual water bodies or stream segments pursuant to subsections (2)(A) through (2)(C) of this rule shall include those identified in Tables G and H and in the Missouri Use Designation Dataset maintained by the department, except as described in paragraph (2)(D)3. of this rule.

2. Designated uses may be assigned on a case-by-case basis to water bodies or stream segments not otherwise represented in Tables G and H or in the Missouri Use Designation Dataset but falling within the jurisdiction of the Missouri Clean Water Law.

3. Assuming reasonable evidence, presumptive beneficial use protections described above shall not apply to water bodies without designated uses pursuant to Tables G or H prior to November 6, 2013 that meet one of the following criteria:

A. Waste treatment systems, or prior converted cropland, which are excluded from the federal definition of "waters of the United States" under 40 CFR 122.2; or

B. Man-made structures which were constructed solely to treat or convey wastewater; or

C. Man-made bodies of water or structures which lack perennial flow and were constructed to treat, convey, or temporarily hold or slow stormwater following precipitation events (this may include certain structures associated with Best Management Practices such as sediment basins, wet and dry detention basins, bioretention basins, rain gardens, bioswales, etc.); or

D. Water bodies that lack jurisdiction under either the federal Clean Water Act or Missouri Clean Water Law.

After receiving such evidence, the department shall make a written determination regarding the applicability of the above-described presumptions, and such determination shall be subject to appeal pursuant to section 621.250, RSMo.

(E) Missouri Use Designation Dataset. The department shall maintain the geospatial dataset described in subsection (1)(P) of this rule. Future revisions to water quality standards in the State of Missouri shall be reflected in the Missouri Use Designation Dataset and shall take effect upon approval by the Clean Water Commission and U.S. Environmental Protection Agency.

(F) Use Attainability. Demonstrations of use attainability for the protection of fish, shellfish and wildlife, recreation in and on the water, or human health protection shall assess the physical, chemical, biological, economic or other factors affecting the attainment of a use pursuant to 40 CFR 131.10(g). Use attainability analyses intended for other designated uses shall be designed and implemented on a case-by-case basis. In accordance with 40 CFR 131.10(j), the following potential actions must be preceded and supported by a use attainability analysis:

1. Designation of a water body for uses that do not include the protection of fish, shellfish and wildlife, recreation in and on the water, and human health protection;

2. Removal of one (1) or more of the uses identified in paragraph 1. of this section; or

3. Application of any use sub-categories for the protection of fish, shellfish and wildlife, recreation in and on the water, or human health protection which require less stringent criteria.

After receiving such demonstration, the department shall make a written determination regarding the use attainability analysis, and such determination shall be subject to appeal pursuant to section 621.250, RSMo.

(3) Antidegradation. The antidegradation policy shall provide three (3) levels of protection.

(A) Tier One. Public health, existing instream water uses, and a level of water quality necessary to protect existing uses shall be maintained and protected.

(B) Tier Two. For all waters of the state, if existing water quality is better than applicable water quality criteria established in these rules, that existing quality shall be fully maintained and protected. Water quality may be lowered only if the state finds, after full satisfaction of the intergovernmental coordination and public participation requirements, that the lowered water quality is necessary to allow important economic and social development in the geographical area in which the waters are located. In allowing the lowering of water quality, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control before allowing any lowering of water quality. This provision allows a proposed new or modified point or nonpoint source of pollution to result in limited lowering of water quality provided that—

1. The source does not violate any of the general criteria set forth in section (4) of this rule, or any of the criteria for protection of beneficial uses set forth in section (5) of this rule;

2. The source meets all applicable technological effluent limitations and minimum standards of design for point sources or minimum pollution control practices for nonpoint sources; and

3. The lowering of water quality, in the judgment of the department, is necessary for the accommodation of important economic and social development in the geographical vicinity of the discharge. In making a preliminary determination based on socioeconomic development considerations, the department may consider the potential for regional increases in utility rates, taxation levels, or recoverable costs associated with the production of goods or services that may result from the imposition of a strict no-degradation policy. Consideration may also be given to the

possible indirect effects of a policy on per capita income and the level of employment in the geographical vicinity of the proposed pollution source. Any preliminary decision by the department to allow a limited lowering of water quality will be stated as such in a public notice issued pursuant to 10 CSR 20-6.010. Pursuant to that provision, a public hearing will be held in the geographical vicinity of the proposed pollution source, if the department determines there is significant public interest in and need for a hearing.

(C) Tier Three. There shall be no lowered water quality in outstanding national resource waters or outstanding state resource waters, as designated in Tables D and E.

(D) The three (3) levels of protection provided by the antidegradation policy in subsections (A) through (C) of this section shall be implemented according to procedures hereby incorporated by reference and known as the "Missouri Antidegradation Rule and Implementation Procedure, July 13, 2016." No later amendments or additions are included. This document shall be made available to anyone upon written request to the Department of Natural Resources, Water Protection Program, Water Pollution Control Branch, PO Box 176, Jefferson City, MO 65102-0176.

(4) General Criteria. The following water quality criteria shall be applicable to all waters of the state at all times including mixing zones. No water contaminant, by itself or in combination with other substances, shall prevent the waters of the state from meeting the following conditions:

(A) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly, or harmful bottom deposits or prevent full maintenance of beneficial uses;

(B) Waters shall be free from oil, scum, and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;

(C) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor, or prevent full maintenance of beneficial uses;

(D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal, or aquatic life. However, acute toxicity criteria may be exceeded by permit in zones of initial dilution, and chronic toxicity criteria may be exceeded by permit in mixing zones;

(E) Waters shall maintain a level of water quality at their confluences to downstream waters that provides for the attainment and maintenance of the water quality standards of those downstream waters, including waters of another state;

(F) There shall be no significant human health hazard from incidental contact with the water;

(G) There shall be no acute toxicity to livestock or wildlife watering;

(H) Waters shall be free from physical, chemical, or hydrologic changes that would impair the natural biological community;

(I) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment, and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to sections 260.200–260.247, RSMo;

(J) Waters in mixing zones, ephemeral aquatic habitat and waters of the state lacking designated uses shall be subject to the following requirements:

1. The acute toxicity criteria of Tables A1, A2, and B1 and the requirements of subsection (5)(B); and

2. The following whole effluent toxicity conditions must be satisfied:

A. Single dilution method. The percent effluent at the edge of the zone of initial dilution will be computed and toxicity tests performed at this percent effluent. These tests must show statistically-insignificant mortality on the most sensitive of at least two (2) representative, diverse species; and

B. Multiple dilution method. An LC_{50} will be derived from a series of test dilutions. The computed percent effluent at the edge of the zone of initial dilution must be less than three-tenths (0.3) of the LC_{50} for the most sensitive of at least two (2) representative, diverse species.

(5) Specific Criteria. The specific criteria shall apply to waters contained in Tables G and H of this rule and the Missouri Use Designation Dataset. Protection of drinking water supply is limited to surface waters designated for raw drinking water supply and aquifers. Protection of whole body contact recreation is limited to waters designated for that use.

(A) The maximum chronic toxicity criteria in Tables A1, A2, B2, and B3 shall apply to waters designated for the indicated uses given in the Missouri Use Designation Dataset and Tables G and H. All Table A1, A2, B2, and B3 criteria are chronic toxicity criteria, except those specifically identified as acute criteria. Water contaminants shall not cause or contribute to concentrations in excess of these values. Table A1 values listed as health advisory levels shall be used in establishing discharge permit limits and management strategies until additional data becomes available to support alternative criteria, or other standards are established. However, exceptions may be granted in the following cases:

1. Permanent flow streams when the stream flow is less than 7Q10;

2. Regulated flow streams if the flow is less than the minimum release flow agreed upon by the regulating agencies;

3. For the natural and unavoidable chemical and physical changes that occur in the hypolimnion of lakes. Streams below impoundments shall meet applicable specific criteria;

4. For mixing zones.

A. The mixing zone shall be exempted from the chronic criteria requirements of this section for those components of waste that are rendered nontoxic by dilution, dissipation, or rapid chemical transformation. Acute numeric criteria of Tables A1, A2, and B1 and whole effluent acute toxicity requirements of subsection (4)(I) must be met at all times within the mixing zone, except within the zone of initial dilution. The following criteria do not apply to thermal mixing zones. Criteria for thermal mixing zones are listed in paragraph (5)(D)6.

B. The maximum size of mixing zones and zones of initial dilution will be determined as follows (the size may be refined by the use of mixing zone models, e.g. CORMIX, as appropriate):

(I) Streams with 7Q10 low flows of less than one-tenth cubic foot per second (0.1 cfs)—

(a) Mixing zone—not allowed; and

(b) Zone of initial dilution—not allowed;

(II) Streams with 7Q10 low flow of one-tenth to twenty cubic feet per second (0.1–20 cfs)—

(a) Mixing zone—one-quarter (1/4) of the stream width, cross-sectional area, or volume of flow; length one-quarter (1/4) mile. If the discharger can document that rapid and complete mixing of the effluent occurs in the receiving stream, the mixing zone may be up to one-half (1/2) of the stream width, cross-sectional area, or volume of flow; and

(b) Zone of initial dilution—one-tenth (0.1) of the mixing zone width, cross-sectional area, or volume of flow;

(III) Streams with 7Q10 low flow of greater than twenty cubic feet per second (20 cfs)—

(a) Mixing zone—one-quarter (1/4) of stream width, cross-sectional area, or volume of flow; length of one-quarter (1/4) mile. If the discharger can document that rapid and complete mixing of the effluent occurs in

the receiving stream, the mixing zone may be up to one-half (1/2) of the stream width, cross-sectional area, or volume of flow; and

(b) Zone of initial dilution—one-tenth (0.1) of the mixing zone width, cross-sectional area, or volume of flow and no more than ten (10) times the effluent design flow volume unless the use of diffusers or specific mixing zone studies can justify more dilution; and

(IV) Lakes—

(a) Mixing zone—not to exceed one-quarter (1/4) of the lake width at the discharge point or one hundred feet (100') from the discharge point, whichever is less; and

(b) Zone of initial dilution—not allowed.

C. A mixing zone shall not overlap another mixing zone in a manner that the maintenance of aquatic life in the body of water in the overlapping area would be further adversely affected.

D. Other factors that may prohibit or further limit the size and location of mixing zones are the size of the river, the volume of discharge, the stream bank configuration, the mixing velocities, other hydrologic or physiographic characteristics, and the designated uses of the water, including type of aquatic life supported, potential effects on mouths of tributary streams, and proximity to water supply intakes.

E. Zones of passage must be provided wherever mixing zones are allowed.

F. Mixing zone and zone of initial dilution size limits will normally be based on streams at the 7Q10 low flow. However, this percent of stream size limits also applies at higher stream flows and discharge limitations may be based on higher stream flows if discharge volume or quality may be adjusted to correlate with stream flow; and

5. For wetlands. Water quality needs will vary depending on the individual characteristics of the wetland. Application of numeric criteria will depend on the specific aquatic life, wildlife, and vegetation requirements.

A. Specific criteria for wetlands shall be developed using scientific procedures including, but not limited to, those procedures described in the U.S. Environmental Protection Agency's *Water Quality Standards Handbook*, Second Edition, August 1994 as published by the Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency, Washington, DC 20460, which are hereby incorporated by reference and do not include any later amendments or additions. The department shall maintain a copy of the referenced documents and shall make them available to the public for inspection and copying at no more than the actual cost of reproduction.

B. Specific criteria shall protect all life stages of species associated with wetlands and prevent acute and chronic toxicity in all parts of the wetland.

C. Specific criteria shall include both chronic and acute concentrations to better reflect the different tolerances to the inherent variability between concentrations and toxicological characteristics of a condition.

D. Specific criteria shall be clearly identified as maximum "not to be exceeded" or average values, and if an average, the averaging period and the minimum number of samples. The conditions, if any, when the criteria apply shall be clearly stated (e.g., specific levels of hardness, pH, or water temperature). Specific sampling requirements (e.g., location, frequency), if any, shall also be identified.

E. The data, testing procedures, and application (safety) factors used to develop specific criteria shall reflect the nature of the condition (e.g., persistency, bioaccumulation potential) and the most sensitive species associated with the wetland.

F. Each specific criterion shall be promulgated in rule 10 CSR 20-7.031. The public notice shall include a description of the affected wetland and the reasons for applying the proposed criterion. A public hearing may be held in the geographical vicinity of the affected wetland. Any specific criterion promulgated under these provisions is subject to U.S. Environmental Protection Agency approval prior to becoming effective.

(B) Toxic Substances.

1. Water contaminants shall not cause the criteria in Tables A1, A2, B1, B2, and B3 to be exceeded. Concentrations of these substances in bottom sediments or waters shall not harm benthic organisms and shall not accumulate through the food chain in harmful concentrations, nor shall state and federal maximum fish tissue levels for fish consumption be exceeded. More stringent criteria may be imposed if there is evidence of additive or synergistic effects.

2. For compliance with this rule, metals shall be analyzed by the following methods:

A. Aquatic life protection and human health protection—

(I) Mercury—total recoverable metals; and

(II) All other metals—dissolved metals;

B. Drinking water supply—total recoverable metals; and

C. All other beneficial uses—total recoverable metals.

3. Other potentially toxic substances for which sufficient toxicity data are not available may not be released to waters of the state until safe levels are demonstrated through adequate bioassay studies.

4. Drinking water criteria, for substances which are rendered nontoxic by transformation processes in the surface water body, shall apply at water supply withdrawal points.

5. Site-specific alternative criteria for human health protection may be allowed. Designation of these site-specific criteria must follow procedures set forth in U.S. Environmental Protection Agency's *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health, October 2000* (EPA-822-B-00-004), as published by the Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency, Washington, DC 20460, which is hereby incorporated by reference and does not include any later amendments or additions. The department shall maintain a copy of the referenced document and shall make it available to the public for inspection and copying at no more than the actual cost of reproduction.

6. Metals criteria for which toxicity is hardness dependent are in equation format in Table A2.

7. Total ammonia nitrogen. For any given sample, the total ammonia nitrogen criteria shall be based on the pH and temperature of the water body measured at the time of each sample at the point of compliance.

A. The acute criteria shall not be exceeded at any time except in those waters for which the department has allowed a zone of initial dilution (ZID). The one- (1-) day Q_{10} low flow condition will be used in determining acute total ammonia nitrogen criteria.

B. The chronic criteria shall not be exceeded except in water segments for which the department has allowed a mixing zone (MZ). The chronic criteria shall be based on a thirty- (30-) day exposure period. Therefore, the thirty- (30-) day Q_{10} low flow condition of the receiving water body will be used in determining chronic total ammonia nitrogen criteria.

C. Without sufficient and reliable data, it is assumed that early life stages are present and must be protected at all times of the year.

(I) Sufficient and reliable data shall include, but are not limited to, seasonal studies on the fish species distributions, spawning periods, nursery periods, duration of sensitive life stages, and water body temperature. Best professional judgment from fishery biologists and other scientists will be considered as appropriate.

(II) The time frames during the year when early life stages are considered to be absent are those time periods when early life stages are present in numbers that, if chronic toxicity did occur, would not affect the long-term success of the populations.

(III) A source of information for determining the duration of early life stages is *The American Society for Testing and Materials (ASTM) Standard E-1241*, "Standard Guide for Conducting Early Life-Stage Toxicity Tests with Fishes."

(IV) Protection of early life stages should include the most sensitive species that have used a water body for spawning and rearing since November 28, 1975.

(C) Bacteria. The protection of whole body contact recreation is limited to waters designated for that use. The recreational season is from April 1 to October 31. The *E. coli* count shall not exceed the criterion listed in Table A1 as a geometric mean during the recreational season in waters designated for whole body contact recreation. The *E. coli* count shall not exceed one hundred twenty-six (126) per one hundred milliliters (100 mL) at any time in losing streams. For waters designated for secondary contact recreation, the *E. coli* count shall not exceed one thousand one hundred thirty-four (1,134) per one hundred milliliters (100 mL) as a geometric mean during the recreational season.

(D) Temperature.

1. For warm water habitats beyond the mixing zone, water contaminant sources and physical alteration of the water course shall not raise or lower the temperature of a stream more than five degrees Fahrenheit (5 °F) or two and seven-ninths degrees Celsius (2 7/9 °C). Water contaminant sources shall not cause or contribute to stream temperature in excess of ninety degrees Fahrenheit (90 °F) or thirty-two and two-ninths degrees Celsius (32 2/9 °C). However, site-specific ambient temperature data and requirements of sensitive resident aquatic species will be considered, when data are available, to establish alternative maxima or deviations from ambient temperatures.

2. For cool water habitats beyond the mixing zone, water contaminant sources and physical alteration of the water course shall not raise or lower the temperature of a stream more than five degrees Fahrenheit (5 °F) or two and seven-ninths degrees Celsius (2 7/9 °C). Water contaminant sources shall not cause or contribute to stream temperature in excess of eighty-four degrees Fahrenheit (84 °F) or twenty-eight and eight-ninths degrees Celsius (28 8/9 °C).

3. For cold water habitats beyond the mixing zone, water contaminant sources and physical alteration of the water course shall not raise or lower the temperature of the water body more than two degrees Fahrenheit (2 °F) or one and one-ninth degrees Celsius (1 1/9 °C). Water contaminant sources shall not cause or contribute to temperatures above sixty-eight degrees Fahrenheit (68 °F) or twenty degrees Celsius (20 °C).

4. Water contaminant sources shall not cause any measurable rise in the temperature of lakes. An increase is allowable for Lake Springfield, Thomas Hill Reservoir, and Montrose Lake; however, discharges from these lakes must comply with temperature limits for streams.

5. For the Mississippi River Zones 1A and 2, the water temperature outside the mixing zone shall not exceed the maximum limits indicated in the following list during more than one percent (1%) of the time in any calendar year. In Zone 1B, limits may not be exceeded more than five percent (5%) of the time in a calendar year. At no time shall the river water temperature outside of the thermal mixing zone exceed the listed limits by more than three degrees Fahrenheit (3 °F) or one and six-ninths degrees Celsius (1 6/9 °C).

	A and B		C	
	(°F)	(°C)	(°F)	(°C)
January	45	7 2/9	50	10
February	45	7 2/9	50	10
March	57	13 8/9	60	15 5/9
April	68	20	70	21 1/9
May	78	25 5/9	80	26 6/9
June	86	30	87	30 5/9
July	88	31 1/9	89	31 6/9
August	88	31 1/9	89	31 6/9
September	86	30	87	30 5/9
October	75	23 8/9	78	25 5/9
November	65	18 3/9	70	21 1/9
December	52	11 1/9	57	13 8/9

A = Zone 1A—Des Moines River to Lock and Dam No. 25.
B = Zone 1B—Lock and Dam No. 25 to Lock and Dam No. 26.
C = Zone 2—Lock and Dam No. 26 to the Missouri-Arkansas state line.

6. Thermal mixing zones shall be limited to twenty-five percent (25%) of the cross-sectional area or volume of a river, unless biological surveys performed in response to section 316(a) of the federal Clean Water Act (or equivalent) indicate no significant adverse impact on aquatic life. Thermal plume lengths and widths within rivers, and all plume dimensions within lakes, shall be determined on a case-by-case basis and shall be based on physical and biological surveys when appropriate.

(E) pH. Water contaminants shall not cause the four- (4-) day average pH concentration of representative samples to be outside of the range of 6.5 to 9.0 standard pH units (chronic toxicity).

(F) Taste- and Odor-Producing Substances. Taste- and odor-producing substances shall be limited to concentrations in the streams or lakes that will not interfere with beneficial uses of the water. For those streams and lakes designated for drinking water supply use, the taste- and odor-producing substances shall be limited to concentrations that will not interfere with the production of potable water by reasonable water treatment processes.

(G) Turbidity and Color. Water contaminants shall not cause or contribute to turbidity or color that will cause substantial visible contrast with the natural appearance of the stream or lake or interfere with beneficial uses.

(H) Solids. Water contaminants shall not cause or contribute to solids in excess of a level that will interfere with beneficial uses. The stream or lake bottom shall be free of materials which will adversely alter the composition of the benthos, interfere with the spawning of fish or development of their eggs, or adversely change the physical or chemical nature of the bottom.

(I) Radioactive Materials. All streams and lakes shall conform to state and federal limits for radionuclides established for drinking water supply.

(J) Dissolved Oxygen. Water contaminants shall not cause the dissolved oxygen to be lower than the levels described in Table A1.

(K) Total Dissolved Gases. Operation of impoundments shall not cause the total dissolved gas concentrations to exceed one hundred ten percent (110%) of the saturation value for gases at the existing atmospheric and hydrostatic pressures.

(L) Sulfate and Chloride Limit for Protection of Aquatic Life.

1. Streams with 7Q10 low flow of less than one cubic foot per second (1 cfs). The concentration of chloride plus sulfate shall not exceed one thousand milligrams per liter (1,000 mg/L). Table A1 includes additional chloride criteria.

2. Streams with 7Q10 low flow of more than one cubic foot per second (1 cfs) and Class P1, L1, L2, and L3 waters. The total chloride plus sulfate concentration shall not exceed the estimated natural background concentration by more than twenty percent (20%) at the 60Q10 low flow.

(M) Carcinogenic Substances. Carcinogenic substances shall not exceed concentrations in water which correspond to the 10^{-6}

cancer risk rate. This risk rate equates to one (1) additional cancer case in a population of one (1) million with lifetime exposure. Derivation of this concentration assumes average water and fish consumption amounts. Assumptions are two (2) liters of water and six and one-half (6.5) grams of fish consumed per day. Federally established final maximum contaminant levels for drinking water supply shall supersede drinking water supply criteria developed in this manner.

(N) Nutrients and Chlorophyll.

1. Definitions.

A. For the purposes of these criteria, all lakes and reservoirs shall be referred to as "lakes."

B. Lake ecoregions—Due to differences in watershed topography, soils, and geology, nutrient criteria for lakes and reservoirs will be determined by the use of four (4) major ecoregions based upon dominant watershed ecoregion. These regions were delineated by grouping the ecological subsections described in Nigh and Schroeder, 2002, *Atlas of Missouri Ecoregions*, as follows:

(I) Plains: OP1 – Scarped Osage Plains; OP2 – Cherokee Plains; TP2—Deep Loess Hills; TP3—Loess Hills; TP4— Grand River Hills; TP5—Chariton River Hills; TP6—Claypan Till Plains; TP7—Wyaconda River Dissected Till Plains; TP8— Mississippi River Hills;

(II) Ozark Border: MB2a—Crowley's Ridge Loess Woodland/Forest Hills; OZ11—Prairie Ozark Border; OZ12— Outer Ozark Border; OZ13—Inner Ozark Border;

(III) Ozark Highland: OZ1—Springfield Plain; OZ2—Springfield Plateau; OZ3—Elk River Hills; OZ4—White River Hills; OZ5—Central Plateau; OZ6—Osage River Hills; OZ7—Gasconade River Hills; OZ8—Meramec River Hills; OZ9—Current River Hills; OZ10—St. Francois Knobs and Basins; OZ14—Black River Ozark Border; and

(IV) Big River Floodplain: MB1—Black River Alluvial Plain; MB2b—Crowley's Ridge Footslopes and Alluvial Plains; MB3—St. Francis River Alluvial Plain; MB4, OZ16, TP9—Mississippi River Alluvial Plain; OZ15, TP1—Missouri River Alluvial Plain.

C. Nutrient Criteria—Nutrient criteria represent the desired condition for a water body necessary to protect the designated uses assigned in rule.

(I) Lake Ecoregion Criteria—A decision framework that integrates causal and response parameters into one water quality standard that accounts for uncertainty in linkages between causal and response parameters.

(a) Response Impairment Thresholds—Maximum ambient concentrations of chlorophyll-a (Chl-a) that are based on annual geometric means of samples collected May through September with an allowable exceedance frequency of one in three (1-in-3) years for lakes that have not been assigned site-specific criteria.

(b) Nutrient Screening Thresholds—Maximum ambient concentrations of total phosphorus (TP), total nitrogen (TN), and Chl-a that are based on the annual geometric mean of samples collected May through September. Nutrient screening thresholds represent causal and response parameter concentrations, above which an exceedance in any one year warrants further evaluation of Response Assessment Endpoints.

(c) Response Assessment Endpoints—Narrative and numeric biological response endpoints that link directly to designated use impairment.

(II) Lake Site-Specific Criteria—Maximum Ambient Concentrations of TP, TN, or Chl-a that are based on the geometric mean of a minimum of three (3) years of data and the characteristics of the waterbody.

2. This rule applies to all lakes that are waters of the state and have an area of at least ten (10) acres during normal pool condition. Big River Floodplain lakes shall not be subject to these criteria.

3. Response Impairment Thresholds are listed in Table L. Nutrient Screening Thresholds are listed in Table M. Lake Site-Specific Criteria for TP, TN, and Chl-a are listed in Table N. Additional lake site-specific criteria may be developed in accordance with subsection (5)(S) to account for the unique characteristics of the waterbody that affect trophic status, such as lake morphology, hydraulic residence time, temperature, internal nutrient cycling, or watershed contribution from multiple ecoregions.

4. All TP, TN, and Chl-a concentrations must be calculated as the geometric mean of a minimum of four (4) representative samples per year for one (1) year for purposes of comparison to lake ecoregion criteria thresholds. All samples must be collected from the lake surface, near the outflow of the lake, and during the period May 1 – September 30.

5. Lakes with water quality that exceed Response Impairment Thresholds or Lake Site-Specific Criteria identified in Tables L and N are to be deemed impaired for excess nutrients.

6. Lakes are to be deemed impaired for excess nutrients if any of the following Response Assessment Endpoints are documented to occur within the same year as an exceedances of Nutrient Screening Thresholds in Table M. The department shall collect information on Response Assessment Endpoints concurrently with collection of Nutrient Screening Threshold parameters. The department shall determine attainment of Nutrient Criteria during the biennial assessment of Missouri waters.

A. Occurrence of eutrophication-related mortality or morbidity events for fish and other aquatic organisms;

B. Epilimnetic excursions from dissolved oxygen or pH criteria;

C. Cyanobacteria counts in excess of one hundred thousand (100,000) cells per milliliter (cells/mL);

D. Observed shifts in aquatic diversity attributed to eutrophication; and

E. Excessive levels of mineral turbidity that consistently limit algal productivity during the period May 1 – September 30.

(O) All methods of sample collection, preservation, and analysis used in applying criteria in these standards shall be in accord with those prescribed in the latest edition of *Standard Methods for the Examination of Water and Wastewater* or other procedures approved by the Environmental Protection Agency and the Missouri Department of Natural Resources.

(P) Criteria to protect designated uses are based on current technical literature, especially the Environmental Protection Agency's publication, *Quality Criteria for Water*, 1986. Criteria may be modified or expanded as additional information is developed or as needed to define narrative criteria for particular situations or locations.

(Q) WET Chronic Tests. Chronic WET tests performed at the percent effluent at the edge of the mixing zone shall not be toxic to the more sensitive of at least two (2) representative, diverse species. Pollutant attenuation processes such as volatilization and biodegradation which may occur within the allowable mixing zone will be considered in interpreting results.

(R) Biocriteria. The biological integrity of waters, as measured by lists or numeric indices of benthic invertebrates, fish, algae, or other appropriate biological indicators, shall not be significantly different from reference waters. Waters targeted for numeric biological criteria assessment must be contained within the Missouri Use Designation Dataset and shall be compared to reference waters of similar size, scale within the stream network, habitat type, and aquatic ecoregion type. Reference water locations for some aquatic habitat types are listed in Table I.

(S) Site-Specific Criteria Development for the Protection and Propagation of Fish, Shellfish, and Wildlife. When water quality criteria in this regulation are either underprotective or overprotective of water quality due to

factors influencing bioavailability, or nonanthropogenic conditions for a given water body segment, a petitioner may request site-specific criteria. The petitioner must provide the department with sufficient documentation to show that the current criteria are not adequate and that the proposed site-specific criteria will protect all existing and/or potential uses of the water body.

1. Site-specific criteria may be appropriate where, but is not limited to, the examples given in subparagraphs A. or B. of this paragraph.

A. The resident aquatic species of the selected water body have a different degree of sensitivity to a specific pollutant as compared to those species in the data set used to calculate the national or state criteria as described in either of the following parts:

(I) Natural adaptive processes have enabled a viable, balanced aquatic community to exist in waters where natural (nonanthropogenic) background conditions exceed the criterion (e.g., resident species have evolved a genetically-based greater tolerance to high concentrations of a chemical); or

(II) The composition of aquatic species in a water body is different from those used in deriving a criterion (e.g., most of the species considered among the most sensitive, such as salmonids or the cladoceran, *Ceriodaphinia dubia*, which were used in developing a criterion, are absent from a water body).

B. The physical and/or chemical characteristics of the water body alter the biological availability and/or toxicity of the pollutant (e.g., pH, alkalinity, salinity, water temperature, hardness). Such an example is the Water Effect Ratio (WER) defined at (1)(BB) of this rule.

2. All petitioners seeking to develop site-specific criteria shall coordinate with the department early in the process. This coordination will ensure the use of adequate, relevant, and quality data; proper analysis and testing; and defendable procedures.

A. The department will provide guidance for establishing site-specific water quality criteria using scientific procedures including, but not limited to, those procedures described in:

(I) U.S. Environmental Protection Agency's *Water Quality Standards Handbook,* Second Edition, August 1994;

(II) U.S. Environmental Protection Agency's *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals* (EPA-823-B-94-001) and subsequent 1997 modifications;

(III) U.S. Environmental Protection Agency's *Streamlined Water-Effect Ratio Procedure for Discharges of Copper* (EPA-822-R-01-005); and

(IV) U.S. Environmental Protection Agency's *Aquatic Life Ambient Freshwater Quality Criteria – Copper 2007 Revision* (EPA-822-R-07-001).

B. Site-specific criteria development for the Protection and Propagation of Fish, Shellfish, and Wildlife shall be performed using the guidance documents listed in parts (5)(S)2.A.(I)–(IV) as published by the Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency, Washington, DC 20460, which are hereby incorporated by reference and do not include any later amendments or additions. The department shall maintain a copy of the referenced documents and shall make them available to the public for inspection and copying at no more than the actual cost of reproduction.

3. Site-specific criteria shall protect all life stages of resident species and prevent acute and chronic toxicity in all parts of a water body.

4. Site-specific criteria shall include both chronic and acute concentrations to better reflect the different tolerances of resident species to the inherent variability between concentrations and toxicological characteristics of a chemical.

5. Site-specific criteria shall be clearly identified as maximum "not to be exceeded" or average values, and if an average, the averaging period and the minimum number of samples. The conditions, if any, when the criteria apply shall be clearly stated (e.g., specific levels of hardness, pH, or water temperature). Specific sampling requirements (e.g., location, frequency), if any, shall also be identified.

6. The data, testing procedures, and application (safety) factors used to develop site-specific criteria shall reflect the nature of the chemical (e.g., persistency, bioaccumulation potential, and avoidance or attraction responses in fish) and the most sensitive resident species of a water body.

7. The size of a site may be limited to a single water segment, single water subsegment, or may cover a whole watershed depending on the particular situation for which the specific criterion is developed. A group of water bodies may be considered one (1) site if their respective aquatic communities are similar in composition and have comparable water quality.

8. The department shall determine if a site-specific criterion is adequate and justifiable. The public notice shall include a description of the affected water body or water body segment and the reasons for applying the proposed criterion. If the department determines that there is significant public interest, a public hearing may be held in the geographical vicinity of the affected water body or water body segment. Any site-specific criterion promulgated under these provisions is subject to U.S. Environmental Protection Agency approval prior to becoming effective for Clean Water Act purposes.

(6) Groundwater.

(A) Water contaminants shall not cause or contribute to exceedence of Table A1, groundwater limits in aquifers and caves. Table A1 values listed as health advisory levels shall be used in establishing management strategies and groundwater cleanup criteria, until additional data becomes available to support alternative criteria or other standards are established. Substances not listed in Table A1 shall be limited so that drinking water, livestock watering, and irrigation uses are protected.

(B) When criteria for the protection of aquatic life or human health protection in Table A1 are more stringent than groundwater criteria, appropriate criteria for the protection of aquatic life or human health shall apply to waters in caves and to aquifers which contribute an important part of base flow of surface waters designated for aquatic life protection. Other substances not listed in Table A1 shall be limited in these aquifers and caves so that the aquatic life use is protected.

(C) Groundwater and other criteria shall apply in any part of the aquifer, including the point at which the pollutant enters the aquifer. A specific monitoring depth requirement for releases to aquifers is included in 10 CSR 20-7.015(7)(A).

(D) For aquifers in which contaminant concentrations exceed groundwater criteria or other protection criteria, and existing and potential uses are not impaired, alternative site-specific criteria may be allowed. To allow alternative criteria, the management authority must demonstrate that alternative criteria will not impair existing and potential uses. The demonstration must consider the factors and be subject to the review requirements of 10 CSR 20-7.015(7)(F).

(7) Metropolitan No-Discharge Streams. No water contaminant except uncontaminated cooling water, permitted stormwater discharges in compliance with permit conditions, and excess wet-weather bypass discharges not interfering with beneficial uses shall be discharged to the watersheds of streams listed in Table F. Existing interim discharges may be allowed until interceptors are available within two thousand feet (2,000') or a distance deemed feasible by the department, or unless construction of outfalls

to alternative receiving waters not listed in Table F is deemed feasible by the department. Existing discharges include wastewater volumes up to the design capacity of existing permitted treatment facilities, including phased increases in design capacity approved by the department prior to the effective date of this rule. Additional facilities may be constructed to discharge to these waters only if they are intended to be interim facilities in accordance with a regional wastewater treatment plan approved by the department.

(8) Outstanding National Resource Waters. Under section (3), antidegradation section of this rule, new releases to outstanding national resource waters from any source are prohibited, and releases from allowed facilities are subject to special effluent limitations as required in 10 CSR 20-7.015(6). Table D contains a list of the outstanding national resource waters in Missouri.

(9) Outstanding State Resources Waters. The commission wishes to recognize certain high-quality waters that may require exceptionally stringent water-quality management requirements to assure conformance with the antidegradation policy. The degree of management requirements will be decided on an individual basis. To qualify for inclusion, all of the following criteria must be met. The waters listed in Table E must—

(A) Have a high level of aesthetic or scientific value;

(B) Have an undeveloped watershed; and

(C) Be located on or pass through lands which are state or federally owned, or which are leased or held in perpetual easement for conservation purposes by a state, federal, or private conservation agency or organization.

(10) Lake Taneycomo. The commission wishes to recognize the uniqueness of Lake Taneycomo with respect to its high water clarity, its importance as a trout fishery, and as the central natural resource in the rapidly developing Branson area and threats to the lake's water quality imposed by development. An especially stringent antidegradation policy will be observed in the development of effluent rules, discharge permits, and nonpoint-source management plans and permits to assure that the high visual quality and aquatic resources are maintained. The use of the best treatment technology for point- and nonpoint-source discharges in the lake's watershed between Table Rock Lake and Power Site Dam will be the guiding principle in establishing limitations.

(11) Compliance with Water Quality Based Limitations. Compliance with new or revised National Pollutant Discharge Elimination System (NPDES) or Missouri operating permit limitations based on criteria in this rule shall be achieved in accordance with federal regulation at 40 CFR Part 122.47, "Schedules of Compliance," May 15, 2000, as published by the Office of the Federal Register, National Archives and Records Administration, Superintendent of Documents, Pittsburgh, PA 15250-7954, which is hereby incorporated by reference and does not include any later amendments or additions. The department shall maintain a copy of the referenced document and shall make it available to the public for inspection and copying at no more than the actual cost of reproduction.

(12) Water Quality Standards Variances. A permittee or an applicant for a National Pollutant Discharge Elimination System (NPDES) or Missouri state operating permit may pursue a temporary variance pursuant to either section 644.061 or section 644.062, RSMo. A variance from water quality standards shall comply with 40 CFR 131.14.

(A) Each variance shall be granted only after public notification and opportunity for public comment. Once any variance to water quality standards is granted, the department shall submit the variance, with an Attorney General Certification that the Clean Water Commission adopted the variance in accordance with state law, to the U.S. Environmental Protection Agency for approval.

(B) Individual variances may be granted using the terms, conditions, and procedures found in the "Missouri Multiple Discharger Variance Framework from the Water Quality Standards of Total Ammonia Nitrogen, CWC-MDV-1-17," finalized by the department on September 15, 2017, which is incorporated by reference and does not include any later amendments or additions. The department shall maintain a copy of the referenced documents and shall make them available to the public for inspection and copying at no more than the actual cost of reproduction.

(C) Variance terms and conditions, including facility name, permit number, receiving stream name, first classified water body ID, discharge location, highest attainable condition, effective permit date, and the variance expiration date will be incorporated into the Missouri Use Designation Dataset and Table J.

(13) Losing Streams.

(A) Losing stream determinations will usually be made upon the first application for discharge to a specific water or location within a watershed for a wastewater treatment facility, subdivision development, or animal waste management facility.

(B) Permits or other approvals for those applications will be processed in accordance with the determinations. Additional permits or approvals will be processed in accordance with the latest determination.

(C) For application purposes, any proposed facility within five (5) miles of a known losing stream segment should presume that facility's receiving stream segment is also losing until and unless a specific geologic evaluation is made of that stream and concludes the stream segment is gaining.

(D) Existing facilities operating under a state operating permit and new facilities being constructed under a construction permit in proximity to stream segments subsequently determined to be losing will be allowed to continue in operation at permitted or approved effluent limits for a period of time lasting the design life of the facility (usually twenty (20) years from the original construction completion), provided the facility is in compliance with its effluent limits and remains in compliance with those limits, and if neither of the following conditions is present:

1. If the discharge from such a facility can be eliminated by connection to a locally available facility, the facility shall be connected within three (3) years of the losing stream determination. A local facility shall be considered available if that facility or an interceptor is within two thousand feet (2000') or a distance deemed feasible by the department; and

2. If the discharge from such a facility is shown to cause pollution of groundwater, the facility shall be upgraded to appropriate effluent standards within three (3) years. The department shall include appropriate groundwater monitoring requirements in permits for any such facilities so that pollution, should it occur, would be detected.

(E) Any additional permits or approvals for increased treatment plant design capacity will be processed in accordance with the newest losing stream determination. No additional permits or approvals for any facilities shall be construed as lengthening the time for compliance with losing stream effluent limitations as established in subsection (13)(D).

(14) Severance. If a section, subsection, paragraph, sentence, clause, phrase, or any part of this rule be declared unconstitutional or invalid for any reason, the remainder of this rule shall not be affected and shall remain in full force and effect.

(15) Effective Date. This rule becomes effective immediately upon adoption and compliance with the requirements of subsection 644.036.3., RSMo, of the Missouri Clean Water Law and Chapter 536, RSMo.

Table A1-Criteria for Designated Uses and Health Advisory Levels

Criteria for Designated Uses							
		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
METALS (µg/L)							
Aluminum (pH 6.5-9.0 SU)	7429905	750					
Antimony	7440360			4,300	6		6
Arsenic	7440382	340	150		50	100	50
Barium	7440393				2,000		2,000
Beryllium	7440417		5		4	100	4
Boron	7440428					2,000	2,000
Cadmium	7440439	Table A2	Table A2		5		5
Chromium (III)	16065831	Table A2	Table A2		100	100	100
Chromium (VI)	18540299	16	11				
Cobalt	7440484					1,000	1,000
Copper	7440508	Table A2	Table A2		1,300	500	1,300
Iron	7439896		1,000				300
Lead	7439921	Table A2	Table A2		15		15
Manganese	7439965						50
Mercury	7439976	1.4	0.77		2		2
Methylmercury	22967926	1.4	0.77				
Nickel	7440020	Table A2	Table A2		100		100
Selenium	7782492		5		50		50
Silver	7440224	Table A2			50		50
Thallium	7440280			6.3	2		2

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
Zinc	7440666	Table A2	Table A2		5,000		5,000
OTHER INORGANIC SUBSTANCES (µg/L)							
Alkalinity (minimum $CaCO_3$)			20,000				
Ammonia	7664417	Table B1	Tables B2 & B3				
Asbestos (Fibers/L)	1332214				7,000,000		
Chloride (mg/L)	16887006	860	230		250		
Chloride + Sulfate	16887006 & 18785723	10 CSR 20-7.031(5)(L)					
Chlorine, Total Residual (Coldwater Aquatic Habitat)	7782505		2				
Chlorine, Total Residual (Warmwater Aquatic Habitat)	7782505	19	11				
Cyanide	57125	22	5.2				
E. coli Bacteria (cfu/100 mL)		WBC-A: 126 WBC-B: 206 SCR: 1,134 10 CSR 20-7.031(5)(C)					
Fluoride (mg/L)					4	4	4
Gases, Total Dissolved (percent saturation)		110%	110%				
Hydrogen Sulfide	7783064		2.0				
Nitrate	14797558				10,000		10,000
Oil and Grease (mg/L)			10				
Oxygen, Dissolved (mg/L) (Coldwater Aquatic Habitat)	7782447	6 (minimum)					
Oxygen, Dissolved (mg/L) (Coolwater Aquatic Habitat)	7782447	5 (minimum)					
Oxygen, Dissolved (mg/L) (Warmwater Aquatic Habitat)	7782447	5 (minimum)					
pH (SU; 4-day average)			6.5 – 9				
Solids Suspended and Turbidity		10 CSR 20-7.031(5)(G–H)					
Sulfate (mg/L)	18785723				250		

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
Temperature		10 CSR 20-7.031(5)(D)					
ORGANIC SUBSTANCES (µg/L)							
Benzenes							
Benzene	71432			71	5		5
Chlorobenzene	108907			21,000	100		100
1,2-Dichlorobenzene (ortho-Dichlorobenzene)	95501			2,600	600		600
1,3-Dichlorobenzene (meta-Dichlorobenzene)	541731			2,600	600		600
1,4-Dichlorobenzene (para-Dichlorobenzene)	106467			2,600	75		75
1,2,4-Trichlorobenzene	120821			940	70		70
1,2,4,5-Tetrachlorobenzene	95943			2.9	2.3		2.3
Pentachlorobenzene	608935			4.1	3.5		3.5
Hexachlorobenzene	118741			0.00074	1		1
Ethylbenzene	100414		320		700		700
Nitrobenzene	98953			1,900	17		17
Styrene (Vinyl Benzene)	100425				100		100
Chlorinated Hydrocarbons							
1,1-Dichloroethylene	75354			3.2	7		7
1,1,1-Trichloroethane	71556				200		200
1,1,2-Trichloroethane	79005			42	5		5
1,1,2,2-Tetrachloroethane	79345			11	0.17		0.17
1,2-Dichloroethane	107062			99	5		5
1,2-Dichloropropane	78875			39	0.52		0.52

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
1,3-Dichloropropene (Dichloropropene)	542756			1,700	87		87
Carbon Tetrachloride (Tetrachloromethane)	56235			5	5		5
cis-1,2-Dichloroethylene	156592				70		70
Hexachloroethane	67721			8.7	1.9		1.9
Tetrachloroethylene	127184			8.85	0.8		0.8
trans-1,2-Dichloroethylene	156605			140,000	100		100
Trichloroethylene	79016			80	5		5
Other Halogenated Hydrocarbons							
Chlorodibromomethane	124481			34	0.41		0.41
Dichlorobromomethane	75274			46	0.56		0.56
Dichlorodifluoromethane	75718			570,000			
Ethylene Dibromide (1,2-Dibromoethane)	106934				0.05		0.05
Methyl Bromide (Bromomethane)	74839			4,000	48		48
Methyl Chloride (Chloromethane)	74873			470	5		5
Methylene Chloride (Dichloromethane)	75092			1,600	4.7		4.7
Total Trihalomethanes (TTHMs)					80		80
Tribromomethane (Bromoform)	75252			360	4.3		4.3
Trichlorofluoromethane	75694			860,000			
Trichloromethane (Chloroform)	67663			470	5.7		5.7
Vinyl Chloride	75014			525	2		2
Ethers							
Bis-2-Chloroethyl Ether	111444			1.4	0.03		0.03

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
Bis-2-Chloroisopropyl Ether	108601			4,360	1,400		1,400
Bis-Chloromethyl Ether	542881			0.00078	0.00013		0.00013
Miscellaneous Organics							
2,3,7,8-TCDD (Dioxin)	1746016			1.4E-08	1.3E-08		1.3E-08
Di (2-ethylhexyl) adipate	103231				400		400
Isophorone	78591			2,600	36		36
Polychlorinated Biphenyls (PCBs)			0.014	0.000045			0.00045
Tributylin (TBT)		0.46	0.072				
Nitrogen Containing Compounds							
1,2-Diphenylhydrazine	122667			0.54	0.04		0.04
3,3'-Dichlorobenzidine	91941			0.08	0.04		0.04
Acrylonitrile (2-propenenitrile)	107131			0.65	0.058		0.058
Benzidine (4,4'-diaminobiphenyl)	92875			0.00053	0.00012		0.00012
Nitrosamines							
N-Nitrosodibutylamine	924163						
N-Nitrosodiethylamine	55185						
N-Nitrosodimethylamine	62759			8	0.0007		0.0007
N-Nitrosodi-n-propylamine	621647			1.4			
N-Nitrosodiphenylamine	86306			16	5		5
N-Nitrosopyrrolidine	930552			91.9			
Polynuclear Aromatic Hydrocarbons (PAHs)							
Acenaphthene	83329			2,700	1,200		1,200

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
Anthracene	120127			110,000	9,600		9,600
Benzo(a)anthracene	56553			0.049	0.0044		0.0044
Benzo(a)pyrene	50328			0.049	0.2		0.2
Benzo(b)fluoranthene	205992			0.049	0.0044		0.0044
Benzo(k)fluoranthene	207089			0.049	0.0044		0.0044
2-Chloronaphthalene	91587		4,300				
Chrysene	218019			0.049	0.0044		0.0044
Dibenzo(a,h)anthracene	53703			0.049	0.0044		0.0044
Fluoranthene	206440			370	300		300
Fluorene	86737			14,000	1,300		1,300
Indeno(1,2,3-cd)pyrene	193395			0.049	0.0044		0.0044
Pyrene	129000			11,000	960		960
Phthalate Esters							
Bis (2-Ethylhexyl) Phthalate	117817			5.9	6		6
Butylbenzyl Phthalate	85687			5,200	3,000		3,000
Diethyl Phthalate	84662			120,000	23,000		23,000
Dimethyl Phthalate	131113			2,900,000	313,000		313,000
Di-n-Butyl Phthalate	84742			12,000	2,700		2,700
Phenolic Compounds							
2-Chlorophenol	95578			400	0.1		0.1
2-Methyl-4,6-Dintrophenol	534521			765	13		13
2,4-Dichlorophenol	120832			790	93		93

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
2,4-Dimethylphenol	105679			2,300	540		540
2,4-Dinitrophenol	51285			14,000	70		70
2,4,5-Trichlorophenol	95954			9,800	2,600		2,600
2,4,6-Trichlorophenol	88062			6.5	2		2
3-Methyl-4-Chlorophenol	59507						
Dinitrophenols	25550587						
Nonylphenol	84852153	28	6.6				
Pentachlorophenol	87865	Table A2	Table A2	8	1		1
Phenol (Coldwater Aquatic Habitat)	108952	5,293	157		100		300
Phenol (Warmwater Aquatic Habitat)	108952	5,293	2,560		100		300
Toluenes							
2,4-Dinitrotoluene	121142			9	0.11		0.04
Toluene	108883			200,000	1,000		1,000
Xylenes (Total)	1330207				10,000		10,000
PESTICIDES (µg/L)							
1,2-Dibromo-3-chloropropane (DBCP)	96128				0.2		0.2
4-4'-Dichlorodiphenyldichloro ethane (DDD)	72548			0.00084	0.00083		0.00083
4-4'-Dichlorodiphenyldichloro ethylene (DDE)	72559			0.00059	0.00059		0.00059
4-4'-Dichlorodiphenyltrichlor oethane (DDT)	50293	1.1	0.001	0.00059	0.00059		0.00059
Acrolein	107028	3	3	780	320		320
Alachlor	15972608				2		2
Aldrin	309002	3.0		0.000079	0.00013		0.00013

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
Atrazine	1912249				3		3
Carbaryl	63252	2.1	2.1				
Carbofuran	1563662				40		40
Chlordane	57749	2.4	0.0043	0.00048	2		2
Chlorophenoxy Herbicide (2,4-D)	94757				70		70
Chlorophenoxy Herbicide (2,4,5-TP)	93721				50		50
Chlorpyrifos	2921882	0.083	0.041				
Dalapon	75990				200		200
Demeton	8065483		0.1				
Diazinon	333415	0.17	0.17				
Dieldrin	60571	0.24	0.056	0.000076	0.00014		0.00014
Dinoseb	88857				7		7
Diquat	85007				20		20
alpha-Endosulfan (Endosulfan)	959988	0.22	0.056				
beta-Endosulfan (Endosulfan)	33213659	0.22	0.056				
Endosulfan Sulfate	1031078						
Endothall	145733				100		100
Endrin	72208	0.086	0.036	0.0023	2		2
Endrin Aldehyde	7421934			0.0023	0.75		0.75
Glyphosate	1071836				700		700
Guthion	86500		0.01				
Heptachlor	76448	0.52	0.0038	0.0002	0.4		0.4

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
Heptachlor Epoxide	1024573	0.52	0.0038	0.00011	0.2		0.2
Hexachlorobutadiene	87683			50	0.45		0.45
Hexachlorocyclopentadiene	77474				50		50
alpha-Hexachlorocyclohexane (alpha-BHC)	319846			0.0074	0.0022		0.0022
beta-Hexachlorocyclohexane (beta-BHC)	319857			0.0074	0.0022		0.0022
delta-Hexachlorocyclohexane (delta-BHC)	319868			0.0074	0.0022		0.0022
gamma-Hexachlorocyclohexane (gamma-BHC; Lindane)	58899	0.95		0.062	0.2		0.2
Technical-Hexachlorocyclohexane	608731						
Malathion	121755		0.1				
Methoxychlor	72435		0.03		40		40
Mirex	2385855		0.001				
Oxamyl (Vydate)	23135220				200		200
Parathion	56382	0.065	0.013				
Picloram	1918021				500		500
Simazine	122349				4		4
Toxaphene	8001352	0.73	0.0002	0.000073	3		3
Health Advisory Levels (µg/L)							
1,1,1,2-Tetrachloroethane	630206				70		70
1,2,3-Trichloropropane	96184				40		40
1,3-Dinitrobenzene	99650				1		1
1,4-Dithiane	505293				80		80
2,4,5-T (2,4,5-Trichlorophenoxyacetic acid)	93765				70		70

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
2,4,6-Trinitrotoluene (Trinitrotoluene)	118967				2		2
Ametryn	834128				60		60
Baygon	114261				3		3
Bentazon	25057890				20		20
Bis-2-Chloroisopropyl Ether	108601				300		300
Bromacil	314409				90		90
Bromochloromethane	74975				90		90
Butylate	2008415				350		350
Carbaryl	63252				700		700
Carboxin	5234684				700		700
Chloramben	133904				100		100
ortho-Chlorotoluene	95498				100		100
para-Chlorotoluene	106434				100		100
Chlorpyrifos	2921882				20		20
DCPA (Dacthal)	1861321				4,000		4,000
Diazinon	333415				0.6		0.6
Dicamba	1918009				200		200
Diisopropyl methylphosphonate	1445756				600		600
Dimethyl methylphosphonate	756796				100		100
Diphenamid	957517				200		200
Diphenylamine	122394				200		200
Disulfoton	298044				0.3		0.3

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
Diuron	330541				10		10
Fenamiphos	22224926				2		2
Fluometron	2164172				90		90
Fonofos	944229				10		10
Hexazinone	51235042				200		200
Malathion	121755				200		200
Maleic hydrazide	123331				4,000		4,000
MCPA (2-Methyl-4-Chlorophenoxyacetic acid)	94746				10		10
Methyl Bromide (Bromomethane)	74839				10		10
Methyl Parathion	298000				2		2
Metolachlor	51218452				70		70
Metribuzin	21087649				100		100
Naphthalene	91203				20		20
Nitroguanidine	556887				700		700
para-Nitrophenol	100027				60		60
Paraquat	1910425				30		30
Pronamide	23950585				50		50
Propachlor	1918167				90		90
Propazine	139402				10		10
Propham	122429				100		100
Tebuthiuron	34014181				500		500
Terbacil	5902512				90		90

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

		Aquatic Life Protection		Human Health Protection	DWS	IRR/ LWP	GRW
POLLUTANT	CAS #	Acute	Chronic	Fish Consumption			
Terbufos	13071799				0.9		0.9
Trichlorofluoromethane	75694				2,000		2,000
Trifluralin	1582098				5		5
Trinitroglycerol	55630				5		5

DWS-Drinking Water Supply
IRR-Irrigation
LWP-Livestock and Wildlife Protection
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
GRW-Groundwater

Table A2. Criteria for Aquatic Life Protection

POLLUTANT	CAS #	
METALS (µg/L) - Hardness Dependent		
Cadmium	7440439	Acute = $e^{(1.0166*\ln(\text{Hardness}) - 3.062490)} * (1.136672 - (\ln(\text{Hardness})*0.041838))$ Chronic = $e^{(0.7977 * \ln(\text{Hardness})-3.909)} * (1.101672-(\ln(\text{Hardness}) * 0.041838))$
Chromium (III)	16065831	Acute = $e^{(0.8190*\ln(\text{Hardness}) + 3.725666)} * 0.316$ Chronic = $e^{(0.8190*\ln(\text{Hardness}) + 0.6848)} * 0.860$
Copper	7440508	Acute = $e^{(0.9422*\ln(\text{Hardness}) - 1.700300)} * 0.960$ Chronic = $e^{(0.8545*\ln(\text{Hardness}) - 1.702)} * 0.960$
Lead	7439921	Acute = $e^{(1.273*\ln(\text{Hardness}) - 1.460448)} * (1.46203 - (\ln(\text{Hardness})*0.145712))$ Chronic = $e^{(1.273*\ln(\text{Hardness}) - 4.704797)} * (1.46203 - (\ln(\text{Hardness})*0.145712))$
Nickel	7440020	Acute = $e^{(0.8460*\ln(\text{Hardness}) + 2.255647)} * 0.998$ Chronic = $e^{(0.8460*\ln(\text{Hardness}) + 0.0584)} * 0.997$
Silver	7440224	Acute = $e^{(1.72*\ln(\text{Hardness}) - 6.588144)} * 0.850$
Zinc	7440666	Acute = $e^{(0.8473*\ln(\text{Hardness}) + 0.884)} * 0.98$ Chronic = $e^{(0.8473*\ln(\text{Hardness}) + 0.884)} * 0.98$
OTHER POLLUTANTS (µg/L) – Equation Dependent		
Pentachlorophenol	87865	Acute = $e^{((1.005 * (\text{pH})) - 4.869)}$ Chronic = $e^{((1.005 * (\text{pH})) - 5.134}$

Table B1. Acute Criteria for Total Ammonia Nitrogen (mg N/L)

pH	Cold-Water Fisheries (1)	Cool & Warm-Water Fisheries (2)
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.6	14.4
7.8	8.1	12.1
7.9	6.7	10.1
8.0	5.6	8.4
8.1	4.6	6.9
8.2	3.8	5.7
8.3	3.1	4.7
8.4	2.5	3.8
8.5	2.1	3.2
8.6	1.7	2.6
8.7	1.4	2.2
8.8	1.2	1.8
8.9	1.0	1.5
9.0	0.8	1.3

(1) Salmonids present: CMC = $[(0.275 / (1+10^{7.204-pH})] + [39.0 / (1+10^{pH-7.204})]$

(2) Salmonids absent: CMC = $[0.411 / (1+10^{7.204-pH})] + [58.4 / (1+10^{pH-7.204})]$

Table B2. Chronic Criteria for Total Ammonia Nitrogen (mg N/L): Early Life Stage Absent (3)(4)

	Temperature (°C)																
pH	**0-7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**
6.5	10.8	10.1	9.5	8.9	8.3	7.8	7.3	6.8	6.4	6.0	5.3	4.6	4.1	3.6	3.1	2.8	2.4
6.6	10.7	9.9	9.3	8.7	8.2	7.7	7.2	6.7	6.3	5.9	5.2	4.6	4.0	3.5	3.1	2.7	2.4
6.7	10.5	9.8	9.2	8.6	8.0	7.5	7.1	6.6	6.2	5.8	5.1	4.5	3.9	3.5	3.0	2.7	2.3
6.8	10.2	9.5	8.9	8.4	7.9	7.4	6.9	6.5	6.1	5.7	5.0	4.4	3.8	3.4	3.0	2.6	2.3
6.9	9.9	9.3	8.7	8.1	7.6	7.2	6.7	6.3	5.9	5.5	4.8	4.3	3.7	3.3	2.9	2.5	2.2
7.0	9.6	9.0	8.4	7.9	7.4	6.9	6.5	6.1	5.7	5.3	4.7	4.1	3.6	3.2	2.8	2.4	2.1
7.1	9.2	8.6	8.0	7.5	7.1	6.6	6.2	5.8	5.4	5.1	4.5	3.9	3.5	3.0	2.7	2.3	2.0
7.2	8.7	8.2	7.6	7.2	6.7	6.3	5.9	5.5	5.2	4.9	4.3	3.7	3.3	2.9	2.5	2.2	1.9
7.3	8.2	7.7	7.2	6.7	6.3	5.9	5.6	5.2	4.9	4.6	4.0	3.5	3.1	2.7	2.4	2.1	1.8
7.4	7.6	7.2	6.7	6.3	5.9	5.5	5.2	4.8	4.5	4.3	3.7	3.3	2.9	2.5	2.2	1.9	1.7
7.5	7.0	6.6	6.2	5.8	5.4	5.1	4.8	4.5	4.2	3.9	3.4	3.0	2.6	2.3	2.0	1.8	1.6
7.6	6.4	6.0	5.6	5.3	5.0	4.6	4.3	4.1	3.8	3.6	3.1	2.7	2.4	2.1	1.9	1.6	1.4
7.7	5.8	5.4	5.1	4.7	4.4	4.2	3.9	3.7	3.4	3.2	2.8	2.5	2.2	1.9	1.7	1.5	1.3
7.8	5.1	4.8	4.5	4.2	4.0	3.7	3.5	3.2	3.0	2.8	2.5	2.2	1.9	1.7	1.5	1.3	1.1
7.9	4.5	4.2	3.9	3.7	3.5	3.2	3.1	2.8	2.7	2.5	2.2	1.9	1.7	1.5	1.3	1.1	1.0
8.0	3.9	3.7	3.4	3.2	3.0	2.8	2.6	2.5	2.3	2.2	1.9	1.7	1.5	1.3	1.1	1.0	0.8
8.1	3.4	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.6	1.4	1.2	1.1	1.0	0.8	0.7
8.2	2.9	2.7	2.5	2.4	2.2	2.1	1.9	1.8	1.7	1.6	1.4	1.2	1.1	0.9	0.8	0.7	0.6
8.3	2.4	2.3	2.1	2.0	1.9	1.7	1.6	1.5	1.4	1.3	1.2	1.0	0.9	0.8	0.7	0.6	0.5
8.4	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.9	0.7	0.7	0.6	0.5	0.4
8.5	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.4
8.6	1.4	1.4	1.3	1.2	1.1	1.0	1.0	0.9	0.8	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3
8.7	1.2	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2
8.8	1.0	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2
8.9	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2
9.0	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1

(3) Without sufficient and reliable data, it is assumed that Early Life Stages are present and must be protected at all times of the year.

(4) Early Life Stages absent CCC = $[0.0577 / (1+10^{7.688-pH})]+[2.487 / (1+10^{pH-7.688})] * 1.45 * 10^{0.028 * (25-MAX(T, 7))}$

Table B3. Chronic Criteria for Total Ammonia Nitrogen (mg N/L): Early Life Stages present (5)

	Temperature (°C)									
pH	**0**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**
6.5	6.6	6.6	6.0	5.3	4.6	4.1	3.6	3.1	2.8	2.4
6.6	6.5	6.5	5.9	5.2	4.6	4.0	3.5	3.1	2.7	2.4
6.7	6.4	6.4	5.8	5.1	4.5	3.9	3.5	3.0	2.7	2.3
6.8	6.2	6.2	5.7	5.0	4.4	3.8	3.4	3.0	2.6	2.3
6.9	6.1	6.1	5.5	4.8	4.3	3.7	3.3	2.9	2.5	2.2
7.0	5.9	5.9	5.3	4.7	4.1	3.6	3.2	2.8	2.4	2.1
7.1	5.6	5.6	5.1	4.5	3.9	3.5	3.0	2.7	2.3	2.0
7.2	5.3	5.3	4.9	4.3	3.7	3.3	2.9	2.5	2.2	1.9
7.3	5.0	5.0	4.6	4.0	3.5	3.1	2.7	2.4	2.1	1.8
7.4	4.7	4.7	4.3	3.7	3.3	2.9	2.5	2.2	1.9	1.7
7.5	4.3	4.3	3.9	3.4	3.0	2.6	2.3	2.0	1.8	1.6
7.6	3.9	3.9	3.6	3.1	2.7	2.4	2.1	1.9	1.6	1.4
7.7	3.5	3.5	3.2	2.8	2.5	2.2	1.9	1.7	1.5	1.3
7.8	3.1	3.1	2.8	2.5	2.2	1.9	1.7	1.5	1.3	1.1
7.9	2.8	2.8	2.5	2.2	1.9	1.7	1.5	1.3	1.1	1.0
8.0	2.4	2.4	2.2	1.9	1.7	1.5	1.3	1.1	1.0	0.8
8.1	2.1	2.1	1.9	1.6	1.4	1.2	1.1	1.0	0.8	0.7
8.2	1.7	1.7	1.6	1.4	1.2	1.1	0.9	0.8	0.7	0.6
8.3	1.5	1.5	1.3	1.2	1.0	0.9	0.8	0.7	0.6	0.5
8.4	1.2	1.2	1.1	1.0	0.9	0.7	0.7	0.6	0.5	0.4
8.5	1.0	1.0	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.4
8.6	0.9	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3
8.7	0.7	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2
8.8	0.6	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2
8.9	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2
9.0	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1

(5) Early Life Stages present: $CCC = [0.0577 / (1+10^{7.688-pH})]+[2.487 / (1+10^{pH-7.688})] * MIN(2.85, 1.45 * 10^{0.028 * (25 - T)})$

Table C
Waters Designated for Cold-Water Fishery

Water Body	Miles/Aces	From	To	County(ies)
Barren Fork	2.0	Mouth	20,31N,4W	Shannon
Bee Creek	1.0	Mouth	Hwy. 65	Taney
Bender Creek	0.7	Mouth	10,31N,9W	Texas
Bennett Springs Creek	2.0	Mouth	Bennett Springs	Laclede
Blue Springs Creek	4.0	Mouth	2,39N,3W	Crawford
Bryant Creek	1.0	3,23N,12W	34,24N,12W	Ozark
Bryant Creek	6.0	19,27N,14W	8,27N,15W	Douglas
Buffalo Creek	10.0	State line	5,23N,33W	McDonald
Bull Creek	5.0	Mouth	34,24N,21W	Taney
Bull Shoals Lake	9,000.0	21/34,20N,15W	---	Ozark
Capps Creek	4.0	Mouth	17,25N,28W	Newton-Barry
Cedar Creek	1.0	21,26N,32W	28,26N,32W	Newton
Center Creek	3.0	24,27N,29W	17,27N,28W	Lawrence
Chesapeake Creek	3.0	Mouth	29,28N,25W	Lawrence
Crane Creek	15.0	8,25N,23W	24,26N,25W	Stone-Lawrence
Current River	19.0	24,31N,6W	Montauk Spring	Shannon-Dent
Dogwood Creek	2.3	Mouth	State line	Stone
Dry Creek	4.0	Mouth	14,37N,3W	Crawford
Eleven Point River	33.5	State line	36,25N,4W	Oregon
Flat Creek	3.0	9,23N,27W	21,23N,27W	Barry
Goose Creek	4.0	Mouth	10,28N,25W	Lawrence
Greer Spring Branch	1.0	Mouth	36,25N,4W	Oregon
Hickory Creek	4.5	13,25N,31W	28,25N,31W	Newton
Hobbs Hollow	2.7	Mouth	State line	Stone
Horse Creek	2.2	Mouth	23,35N,8W	Dent
Hunter Creek	5.0	22,26N,15W	20,26N,14W	Douglas
Hurricane Creek	1.5	Mouth	30,24N,12W	Ozark
Hurricane Creek	3.2	Mouth	22,25N,3W	Oregon
Indian Creek	1.4	Mouth	17,21N,23W	Stone
Indian Creek	20.0	Mouth	36,39N,01W	Franklin-
Johnson Creek	3.0	Mouth	36,29N,26W	Lawrence
Joyce Creek	1.0	17,24N,28W	16,24N,28W	Barry
L. Flat Creek	3.5	Mouth	25,25N,27W	Barry
L. Piney Creek	15.0	25,37N,9W	4,35N,8W	Phelps
L. Piney Creek	4.0	04,35N,08W	21,35N,08W	Phelps
L. Sinking Creek	2.2	Mouth	33,32N,4W	Dent
Lake Taneycomo	1,730.0	8,23N,20W	---	Taney
Lyman Creek	1.0	Mouth	30,40N,3W	Crawford
Maramec Spring Branch	1.0	Mouth	1,37N,6W	Phelps
Meramec River	10.0	22,38N,5W	Hwy. 8	Crawford
Mill Creek	1.5	Mouth	11,40N,8W	Maries
Mill Creek	1.5	Mouth	9,36N,18W	Dallas
Mill Creek	5.0	29,37N,9W	Yelton Spring	Phelps
N. Fork White River	23.0	09,22N,12W	34,25N,11W	Ozark
Niangua River	6.0	11,35N,18W	Bennett Sp. Creek	Dallas
Roaring River	7.0	Mouth	34,22N,27W	Barry
Roark Creek	3.0	Mouth	36,23N,22W	Taney
Roubidoux Creek	4.0	Mouth	25,36N,12W	Pulaski
S. Indian Creek	9.0	24,24N,31W	1,23N,30W	Newton
Schafer Spring Creek	2.0	Mouth	20,32N,6W	Dent
Shoal Creek	1.0	Mouth	18,41N,17W	Morgan
Shoal Creek	7.0	09,25N,29W	16,22N,21W	Newton
Spring Branch	1.0	Mouth	18,41N,17W	Morgan
Spring Creek	5.0	Mouth	14,23N,11W	Ozark
Spring Creek	6.5	Mouth	31,35N,9W	Phelps
Spring Creek	2.5	Mouth	4,41N,2W	Franklin
Spring Creek	5.5	Mouth	12,26N,24W	Stone
Spring Creek	6.0	Mouth	06,24N,13W	Douglas-Ozark
Spring Creek	2.5	Mouth	26,25N,11W	Douglas
Spring Creek	4.0	Mouth	30,25N,4W	Oregon
Spring River	11.2	13,27N,27W	20,26N,26W	Lawrence
Stone Mill Spring Branch	0.2	Mouth	Spring	Pulaski
Terrell Creek	2.0	Mouth	2,27N,23W	Christian

Table C
Waters Designated for Cold-Water Fishery

Water Body	Miles/Aces	From	To	County(ies)
Tory Creek	2.5	Mouth	27,26N,22W	Stone-Christian
Turkey Creek	2.0	Mouth	16,22N,21W	Taney
Turkey Creek	1.0	Mouth	17,23N,15W	Ozark
Turnback Creek	14.0	35,30N,26W	24,28N,25W	Dade-Lawrence
Warm Fork Spring River	3.0	6,22N,5W	30,23N,5W	Oregon
Whittenburg Creek	2.5	Mouth	Hwy. 8	Crawford
Williams Creek	1.0	Mouth	28,28N,27W	Lawrence
Woods Fork Bull Creek	1.0	15,25N,21W	15,25N,21W	Christian
Yadkin Creek	3.0	Mouth	9,37N,4W	Crawford
Yankee Branch	1.0	Mouth	10.36N.4W	Crawford

Table D
Outstanding National Resource Waters

Water Body	Location	County(ies)
Current River	Headwaters to Northern Ripley Co. Line Sec. 22,32N,07W to Sec. 15,25N,01E	Dent to Ripley
Jacks Fork River	Headwaters to Mouth Sec. 29,28N,07W to Sec. 9/15,29N,03W	Texas to Shannon
Eleven Point River	Headwaters to Hwy. 142 Sec. 32,25N,05W to Sec. 21,22N,02W	Oregon

Table E
Outstanding State Resource Waters

Water Body	Miles/Acres	Location	County(ies)
Baker Branch	4 mi.	Taberville Prairie	St. Clair
Bass Creek	1 mi.	in Three Creek Conservation Area	Boone
Big Buffalo Creek	1.5 mi.	Big Buffalo Creek Conservation Area	Benton-Morgan
Big Creek	5.3 mi.	Sam A. Baker State Park	Wayne
Big Sugar Creek	7 mi.	Cuivre River State Park	Lincoln
Big Lake Marsh	150 ac.	Big Lake State Park	Holt
Blue Springs Creek	4 mi.	Blue Spring Creek Conservation Area	Crawford
Bonne Femme Creek	2 mi.	Three Creeks Conservation Area	Boone
Brush Creek	0.7 mi.	Bonanza Conservation Area	Caldwell
Bryant Creek	1.5 mi.	Bryant Creek Natural Area in Rippee Conservation Area	Ozark/Douglas
Bull Creek	8 mi.	Mark Twain National Forest Sec. 24,25N,21W to Sec. 22,26N,20W	Christian
Cathedral Cave Branch	5 mi.	Onondaga Cave State Park	Crawford
Chariton River	9.8 mi.	Rebels Cove Conservation Area	Putnam- Schuyler
Chloe Lowry Marsh	40 ac.	Chloe Lowry Marsh Conservation Area	Mercer
Coakley Hollow	1.5 mi.	Lake of the Ozarks State Park	Camden
Coonville Creek	2 mi.	St. Francois State Park	St. Francois
Courtois Creek	12 mi.	Mouth to Hwy. 8	Crawford
Crabapple Creek	1.0 mi.	Bonanza Conservation Area	Caldwell
Devils Ice Box Cave Branch	1.5 mi.	Rock Bridge State Park	Boone
East Fork Black River	3 mi.	Johnson's Shut-Ins State Park	Reynolds
First Nicholson Creek (East Drywood Creek)	2 mi.	Prairie State Park	Barton
Gan's Creek	3 mi.	Rock Bridge State Park	Boone
Huzzah Creek	6 mi.	Mouth to Hwy. 8	Crawford
Indian Creek	17.5 mi.	Mark Twain National Forest	Douglas- Howell
Ketchum Hollow	1.5 mi.	Roaring River State Park	Barry
Little Piney Creek	25 mi.	Mouth to 21,35N,08W	Phelps
Little Black River	3 mi.	Mud Puppy Natural History Area S22,T24N,R3E to S25,T24N,R3E	Ripley
Log Creek	0.4 mi.	Bonanza Conservation Area	Caldwel
Meramec River	8 mi.	Adjacent to Meramac State Park	Crawford/Franklin

Table E
Outstanding State Resource Waters

Water Body	Miles/Acres		Location	County(ies)
Meramec River	3	mi.	Adjacent to Onondaga and Huzzah State Forest	Crawford
Mill Creek	5	mi.	Mark Twain National Forest	Phelps
N. Fork White River	5.5	mi.	Mark Twain National Forest	Ozark
Noblett Creek	5	mi.	Above Noblett Lake, Mark Twain National Forest	Douglas-Howell
Onondaga Cave Branch	0.6	mi.	Onondaga Cave State Park	Crawford
Pickle Creek	3	mi.	Hawn State Park	Ste. Genevieve
S. Prong L. Black River	2	mi.	In Little Black Conservation Area	Ripley
Shoal Creek	0.5	mi.	Bonanza Conservation Area	Caldwell
Spring Creek	17	mi.	Mark Twain National Forest	Douglas
Spring Creek	6.5	mi.	Mark Twain National Forest	Phelps
Taum Sauk Creek	5.5	mi.	Johnson's Shut-Ins State Park Addition S23,T33N,R2E to S5,T33N,R3E	Reynolds-Iron
Turkey Creek	4.6	mi.	In Three Creeks Conservation Area	Boone
Van Meter Marsh	80	ac.	Van Meter State Park	Saline
Whetstone Creek	5.1	mi.	Whetsone Creek Conservation Area	Callaway

Table F
Metropolitan No-Discharge Streams

Stream	Location
St. Louis Area	
Gravois Creek	Entire length
Creve Coeur Creek	Creve Coeur Lake and stream above lake
Fee Fee Creek	Entire length
Coldwater Creek	Entire length
Dardenne Creek	Route DD—I-70 Highway—St. Charles County
Belleau Creek	Headwaters—0.1 mi. west of east edge of S22,T47N,R3E
Fishpot Creek	Entire length
Grand Glaize Creek	Entire length
Kansas City Area	
Indian Creek	Kansas state line to confluence with Blue River
Blue River	Kansas state line to 59th Street, Kansas City
Blue River (except combined sewer overflow from Brush Creek)	59th Street to Guinotte Dam
Little Blue River	Entire length
Springfield Area	
Pearson Creek	Entire length

Table G-Lake Classifications and Use Designations

NOTE: Fishing, Swimming and livestock watering may not be allowed in some lakes by the local management authorities. The use designations refer only to the protection of water quality for those potential uses.

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
100K Extent-Remaining Lakes	L3	26111.0	Statewide	Statewide	X	X		B	X		
Adrian Reservoir	L1	45.0	03,41N,31W	Bates	X	X		B	X	X	
Agate Lake	L3	210.7	13,60N,06W	Lewis	X	X		A	X		
Alpine Lake	L3	233.0	13,46N,2W	Warren	X	X		A	X		
Amarugia Lake	L3	39.0	10/11,43N,32W	Cass	X	X		B	X		
Anderson's Whippoorwill Farm Lake	L3	30.0	SW SE 28,28N,11E	Stoddard	X	X		B	X		
Anthonies Mill Lake	L3	91.0	SW SW 19,39N,01W	Washington	X	X		B	X		
Antimi Lake	L3	2.0	NE NE 3,48N,12W	Boone	X	X		B	X		
Apollo Lake	L3	15.0	21,36N,05E	St. Francois	X	X		B	X		
Appleton City Lake	L1	35.0	12,39N,29W	Bates	X	X		B	X	X	
Archie Lakes	L1	7.3	SESE28,43N,31W	Cass	X	X		B	X	X	
Armstrong Lake	L1	8.0	NE NE 28,52N,16W	Howard	X	X		B	X	X	
Arno Kreter Lake	L3	5.0	27,41N,5W	Gasconade	X	X		B	X		
Athens State Park Lake	L3	8.0	30,67N,07W	Clark	X	X		A	X		
Atkinson Lake	L3	434.0	6,37N,28W	St. Clair	X	X		A	X		
Atlanta City Lake	L1	17.0	SE SW29,59N,14W	Macon	X	X		B	X	X	
August A Busch Lake Number 34	L3	34.0	Landgrant01669	St. Charles	X	X		B	X		
August A Busch Lake Number 35	L3	51.0	Landgrant01669	St. Charles	X	X		B	X		
August A Busch Lake Number 37	L3	30.0	27,46N,2E	St. Charles	X	X		B	X		
Austin Community Lake	L3	21.0	30,29N,11W	Texas	X	X		A	X		
Autumn Lake	L3	4.0	21,40N,16W	Camden	X	X		B	X		
Baha Trail Lake	L3	16.0	05,39N,01E	Washington	X	X		B	X		
Baring Country Club Lake	L1	85.0	26,63N,12W	Knox	X	X		A	X	X	
Bass Lake	L3	29.0	13,47N,08W	Callaway	X	X		A	X		
Bean Lake	L3	420.0	12,13,14,23, 24, 54N,37W	Platte	X	X		B	X		
Bear Creek Watershed Structure F-1	L3	27.0	6,63N,9W	Clark	X	X		B	X		
Bear Creek Watershed Structure X-5	L3	34.0	15,64N,10W	Scotland	X	X		B	X		
Beaver Lake	L3	14.0	22,25N,04E	Butler	X	X		A	X		
Bee Run Lake Number One	L3	5.0	26,38N,4E	St. Francois	X	X		B	X		
Bee Run Lake Number Three	L3	6.0	24,38N,4E	St. Francois	X	X		B	X		
Bee Run Lake Number Two	L3	4.0	23,38N,4E	St. Francois	X	X		B	X		
Bee Tree Lake	L3	10.0	03,42N,06E	St. Louis	X	X		B	X		
Belcher Branch Lake	L3	42.0	08/17,55N,34W	Buchanan	X	X		B	X		
Belle City Lake	L3	6.0	20,41N,07W	Maries	X	X		B	X		
Belleview Lake	L1	105.0	16,61N,9W	Lewis	X	X		B	X	X	
Ben Branch Lake	L3	37.0	15/14,44N,08W	Osage	X	X		B	X		
Bennitt Lake	L3	47.0	2,51N,14W	Howard	X	X		B	X		
Berndt Lake	L1	21.0	NE SW30,66N,23W	Mercer	X	X		B	X	X	

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
Bevier Lake	L3	5.0	S SE,14,57N,15W	Macon	X	X		B	X		
Big Buffalo C.A. Lakes	L3	7.9	2,12,41N,20W	Benton	X	X		B	X		
Big Lake	L3	666.0	18&19,30,61N,39W	Holt	X	X		A	X		
Big Lake	L3	25.0	6,48N,7W	Callaway	X	X		B	X		
Big Oak Tree S.P. Lake	L3	33.0	14,23N,16E	Mississippi	X	X		B	X		
Big Soldier Lake	L3	5.0	36,50N,19W	Saline	X	X		B	X		
Bilby Ranch Lake	L3	95.0	13/24,64N,38W	Nodaway	X	X		B	X		
Binder Lake	L3	127.0	SW SE36,45N,13W	Cole	X	X		B	X		
Blind Pony Lake	L3	96.0	NW SE18,49N,22W	Saline	X	X		B	X		
Bloodland Lake (Ft. Wood)	L3	38.1	04,34N,11W	Pulaski	X	X		B	X		
Blue Mountain Lake	L1	14.0	NW SE,09,33N,5E	Madison	X	X		B	X	X	
Blue Springs Lake	L3	642.0	33 ,49N,31W	Jackson	X	X		A	X		
Blues Pond	L3	10.0	09,37N,08W	Phelps	X	X		B	X		
Bluestem Lake	L3	13.0	22,47N,31W	Jackson	X	X		B	X		
Bo Co Mo Lake	L3	140.0	NW NE10,49N,13W	Boone	X	X		B	X		
Bodarc Lake	L3	13.0	23,47N,31W	Jackson	X	X		B	X		
Boggs Lake	L3	32.0	21-28,44N,05W	Gasconade	X	X		B	X		
Bonne Aqua Lake	L3	6.0	SE NE 26,38N,04E	St. Francois	X	X		B	X		
Bonne Terre City Lake	L3	10.0	SUR 467,37N,04E	St. Francois	X	X		B	X		
Bowling Green Reservoir	L1	41.0	W NW29,53N,02W	Pike	X	X		B	X	X	
Brays Lake	L3	162.0	NE NW35,37N,08W	Phelps	X	X		B	X		
Breckenridge Lake	L1	13.0	NE SW3,57N,26W	Caldwell	X	X		B	X	X	
Brookfield Lake	L1	120.0	SE SE33,58N,19W	Linn	X	X		B	X	X	
Browning Lake	L3	120.0	22,25,26,27,3N,22E	Buchanan	X	X		B	X		
Bucklin Lake	L1	17.0	11,57N,18W	Linn	X	X		B	X	X	
Buffalo Bill Lake	L3	45.0	28,58N,31W	DeKalb	X	X		B	X		
Buffalo Lake	L3	2.0	9,48N,7W	Callaway	X	X		B	X		
Bull Shoals Lake	L2	9000.0	21/34,20N,15W	Ozark	X	X	X	A	X		
Burlington Lake	L3	21.0	34,57N,30W	Clinton	X	X		B	X		
Bushwacker Lake	L3	148.0	26,34N,32W	Vernon	X	X		B	X		
Butler Lake	L1	71.0	NW NE14,40N,32W	Bates	X	X		B	X	X	
Butterfly Lake	L3	65.0	NW NE34,36N,07E	Ste. Genevieve	X	X		B	X		
C and A Lake	L3	39.0	25,51N,09W	Audrain	X	X		B	X		
Callaway Lake	L3	135.0	06,45N,02E	St. Charles	X	X		A	X		
Cameron Lake #1	L1	25.0	SW SW10,57N,30W	DeKalb	X	X		B	X	X	
Cameron Lake #2	L1	31.0	SW SW10,57N,30W	DeKalb	X	X		B	X	X	
Cameron Lake #3	L1	92.0	NW NE09,57N,30W	DeKalb	X	X		B	X	X	
Cameron Lake #4 (Grindstone Reservoir)	L1	173.0	NE NW 08,57N,30W	DeKalb	X	X		B	X	X	
Camp Solidarity Lake	L3	10.0	24,43N,02E	Franklin	X	X		B	X		
Carrollton Recreation Lake	L3	61.0	SE NW07,52N,23W	Carroll	X	X		B	X		
Catclaw Lake	L3	42.0	14,47N,31W	Jackson	X	X		B	X		
Cattail Lake	L3	4.0	5,46N,15W	Cooper	X	X		B	X		
Cedar Hill Lake Number 1	L3	10.0	35,42N,3E	Jefferson	X	X		A	X		
Cedar Hill Lake Number 2	L3	10.0	35,42N,3E	Jefferson	X	X		A	X		
Cedar Hill Lake Number 3	L3	2.0	35,42N,3E	Jefferson	X	X		A	X		
Cedar Lake	L3	21.0	35,48N,13W	Boone	X	X		A	X		

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
Cedar Lake	L3	45.0	SE SE 21,37N,05E	St. Francois	X	X		A	X		
Charity Lake	L3	9.0	NW SE 1,65N,41W	Atchison	X	X		B	X		
Chaumiere Lake	L3	3.0	6,50N,32W	Clay	X	X		B	X		
Church Lake	L3	3.0	4,46N,15W	Moniteau	X	X		B	X		
City Lake Harrisonville	L1	28.0	34,45N,31W	Cass	X	X		B	X	X	
Clarence Cannon Memorial Structure Number 4	L3	9.0	Landgrant01743	Lincoln	X	X		B	X		
Clarence Cannon Memorial Watershed Structure Number 1 Reservoir	L3	23.0	28,51N,1E	Lincoln	X	X		B	X		
Clarence Cannon Memorial Watershed Structure Number 15	L3	20.0	Landgrant01819	Lincoln	X	X		B	X		
Clarence Lake #2	L1	31.0	15,57N,12W	Shelby	X	X		B	X	X	
Clear Fork Lake	L3	16.0	30,46N,24W	Johnson	X	X		B	X		
Clear Lake	L3	13.0	36 39N,4E	Jefferson	X	X		A	X		
Clearwater Lake	L2	1635.0	6,28N,3E	Wayne	X	X		A	X		
Cleveland Reservoir	L1	10.0	29,45N,33W	Cass	X	X		B	X	X	
Clover Dell Park Lake	L3	10.0	13,45N,22W	Pettis	X	X		B	X		
Cloverleaf Farm Lake	L3	50.0	19,47N,1E	St. Charles	X	X		B	X		
Cole Lake	L3	40.0	SE10,38N,04E	Jefferson	X	X		A	X		
Cool Valley Lake	L3	19.0	9,40N,2E	Franklin	X	X		B	X		
Cooley Lake	L3	380.0	02,03,11, 51N,30W	Clay	X	X		B	X		
Coot Lake	L3	20.0	22,47N,31W	Jackson	X	X		B	X		
Cosmo-Bethel Lake	L3	6.0	NW36,48N,13W	Boone	X	X		B	X		
Cottontail Lake	L3	22.0	14,47N,31W	Jackson	X	X		B	X		
Council Bluff Lake	L3	423.0	23,35N,01E	Iron	X	X		A	X		
Crane Lake	L3	109.0	W33,32N,04E	Iron	X	X		B	X		
Creighton Lake	L1	18.0	NW SE,14,43N,29W	Cass	X	X		B	X	X	
Crescent Lake	L3	8.0	NE 02,41N,01W	Franklin	X	X		B	X		
Creve Coeur Lake	L3	327.0	20,46N,05E	St. Louis	X	X		B	X		
Crowder St. Park Lake	L3	18.0	12,61N,25W	Grundy	X	X		A	X		
Crystal Lake	L3	122.0	NW SW32,53N,29W	Ray	X	X		A	X		X
Cut-Off Lake	L3	148.5	01,12,57N,36W	Buchanan	X	X		B	X		
Cut-Off Lake	L3	674.0	26,27,34,35,53N,19W	Chariton	X	X		B	X		
D C Rogers Lake	L1	195.0	NW NW10,50N,16W	Howard	X	X		B	X	X	
Dairy Farm Lake Number 1	L3	14.0	Landgrant02835	Boone	X	X		B	X		
Daniel Boone Lake	L3	288.0	32,58N,12W	Shelby	X	X		B	X		
Davis Lake	L3	44.0	NE NW15,50N,16W	Howard	X	X		B	X		
Dearborn Reservoir	L1	7.0	31,55N,34W	Buchanan	X	X		B	X	X	
Deer Ridge Community Lake	L3	45.0	18,62N,8W	Lewis	X	X		B	X		
Deer Run Lake	L3	31.0	19,34N,7E	Madison	X	X		B	X		
Delaney Lake	L3	100.0	30,27N,16E	Mississippi	X	X		B	X		
Dexter City Lake	L3	11.0	22,25N,10E	Stoddard	X	X		B	X		
Downing Reservoir	L1	22.0	17,66N,13W	Schuyler	X	X		B	X	X	
Drexel City Reservoir South	L1	51.0	7,42N,33W	Bates	X	X		B	X	X	
Drexel Lake	L1	28.0	6, 42N,33W	Bates	X	X		B	X	X	
Duck Creek	L3	1730.0	31,28N,09E; 5, 27N, 9E	Wayne	X	X		B	X		
Eagle Sky Lake	L3	62.0	NW NW35,30N,04E	Wayne	X	X		B	X		
Eagleville Lake	L1	40.0	33,66N,27W	Harrison	X	X		A	X	X	

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
East Arrowhead Lake	L3	55.0	SE SE18,23N,08W	Howell	X	X	X	A	X		
Edina Lake	L1	9.0	07,62N,11W	Knox	X	X		B	X	X	
Edina Reservoir	L1	51.0	12,62N,11W	Knox	X	X		B	X	X	
Edwin A Pape Lake	L1	272.5	20,48N,24W	Lafayette	X	X		B	X	X	
Ella Ewing Community Lake	L3	12.0	21,64N,10W	Scotland	X	X		A	X		
Elmwood City Lake	L1	197.0	NW 35,63N,20W	Sullivan	X	X		B	X	X	
Elsie Lake	L3	17.0	30,37N,02E	Washington	X	X		A	X		
Ethel Lake	L1	23.0	NE NW36,59N,17W	Macon	X	X		B	X	X	
Ewing Lake	L1	38.0	6,60N,7W	Lewis	X	X		B	X	X	
Fawn Lake	L3	26.0	13,43N,02W	Franklin	X	X		B	X		
Fellows Lake	L1	800.0	NW NE22,30N,21W	Greene	X	X		A	X	X	
Finger Lakes	L3	118.0	19,30,31,50N,12W,24,25,36,50N13 W	Boone	X	X		A	X		
Flat Rock Lake	L3	18.0	31,41N,3E	Jefferson	X	X		B	X		
Flight Lake	L3	100.0	26,36N,32W	Vernon	X	X		B	X		
Fon-Du-Lac Reservoir	L3	24.0	Landgrant01331	Jefferson	X	X		A	X		
Forest Lake	L1	580.0	SE SW14,62N,16W	Adair	X	X		A	X	X	
Fountain Grove Lakes	L3	1366.3	35,57N,22W	Linn	X	X		B	X		
Fourche Lake	L3	49.0	22,23N,1W	Ripley	X	X		A	X		
Fox Valley Lake	L3	105.0	27,66N,8W	Clark	X	X		B	X		
Foxboro Lake	L3	22.0	14,42N,4W	Franklin	X	X		B	X		
Foxtail Lake	L3	3.0	4,46N,1W	Warren	X	X		B	X		
Fredricktown City Lake	L1	80.0	06,33N,07E	Madison	X	X		B	X	X	
Freeman Lake	L1	13.0	SW SW18,44N,32W	Cass	X	X		B	X	X	
Frisco Lake	L3	5.0	SE SE 02,37N,08W	Phelps	X	X		B	X		
Garden City Lake	L1	26.0	31,44N,29W	Cass	X	X		B	X	X	
Garden City New Lake	L1	39.0	NW18,43N,29W	Cass	X	X		B	X	X	
Gerald City Lake	L3	5.0	12,42N,4W	Franklin	X	X		B	X		
Glover Spring Lake	L3	23.0	13,47N,09W	Callaway	X	X		B	X		
Goff Spring Lake	L3	13.0	23,38N,4E	St. Francois	X	X		B	X		
Golden Eagle Lake	L3	105.0	SE SW16,48N,04W	Montgomery	X	X		B	X		
Goose Creek Lake	L3	316.0	25,38N.,6E	Ste. Genevieve	X	X		A	X		
Gopher Lake	L3	38.0	23,47N,31W	Jackson	X	X		B	X		
Gower Lake	L1	11.0	10,55N,33W	Clinton	X	X		B	X	X	
Green City Lake	L1	57.0	SE NE16,63N,18W	Sullivan	X	X		B	X	X	
Green City Lake (Old)	L1	60.0	SE18,63N,18W	Sullivan	X	X		A	X	X	
Hager Lake	L3	9.0	SUR 2969,35N,05E	St. Francois	X	X		B	X		
Hamilton Lake	L1	80.0	SW SW15,57N,28W	Caldwell	X	X		B	X	X	
Happy Holler Lake	L3	68.0	8,60N,34W	Andrew	X	X		B	X		
Harmony Mission Lake	L3	96.0	15,38N,32W	Bates	X	X		B	X		
Harper Lake	L3	26.0	16,45N,32W	Cass	X	X		B	X		
Harrison County Lake	L1	280.0	17/30,65N,28W	Harrison	X	X		B	X	X	
Harrisonville City Lake	L1	419.0	SW SW26,46N,31W	Cass	X	X		B	X	X	
Harry S Truman Reservoir	L2	55600.0	7,40N,22W	Benton	X	X		A	X	X	
Hazel Creek Lake	L1	518.0	1,63N,16W	Adair	X	X		B	X	X	
Hazel Hill Lake	L3	62.0	27,47N,26W	Johnson	X	X		B	X		

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
Helvey Park Lake	L1	11.0	26,53N,33W	Clay	X	X		B	X	X	
Hemitite Lake	L3	215.0	19,35N,4E	St. Francois	X	X		B	X		
Henke Lake	L3	22.0	20,46N,9W	Callaway	X	X		B	X		
Henry Sever Lake	L3	153.0	14,60N,10W	Knox	X	X		A	X		
Hermit Hollow Lake	L3	8.0	29,44N,02E	Franklin	X	X		B	X		
Hi Point Lake	L3	3.0	24,39N,01E	Washington	X	X		B	X		
Higbee Lake	L1	13.0	SE SW09,52N,14W	Randolph	X	X		B	X	X	
Higginsville Reservoir (North)	L1	47.0	NE SW04,49N,25W	Lafayette	X	X		B	X	X	
Higginsville Reservoir (South)	L1	147.1	SW NE09,49N,25W	Lafayette	X	X		B	X	X	
Holden City Lake	L1	290.2	29,46N,28W	Johnson	X	X		B	X	X	
Holden Lake	L3	11.0	12,45N,28W	Johnson	X	X		B	X		
Holden Lake	L3	11.0	07,45N,27W	Johnson	X	X		B	X		
Holiday Acres Lake	L3	206.1	SE SW17,55N,14W	Randolph	X	X		B	X		
Horseshoe Lake	L3	56.0	15,56N,36W	Buchanan	X	X		B	X		
Horseshoe Lake	L3	5.0	8,48N,7W	Callaway	X	X		B	X		
Hough Park Lake	L3	10.0	19,44N,11W	Cole	X	X		B	X		
Houston Lake	L3	16.0	NW 33,51N,33W	Platte	X	X		A	X		
Howell Mill Lakes	L3	97.0	17,36N,01E	Washington	X	X		A	X		
Hunnewell Lake	L3	228.0	NW SW25,57N,09W	Shelby	X	X		B	X		
Hurdland Severs Lake	L3	13.0	1,61N,13W	Knox	X	X		A	X		
Incline Village Lake	L3	165.0	6,47N,1E	St. Charles	X	X		B	X		
Indian Creek Community Lake	L3	199.0	27,59N,25W	Livingston	X	X		B	X		
Indian Lake	L3	279.0	22,15,23,39N,05W	Crawford	X	X		A	X		
Iron Mountain Lake	L3	79.0	SE SW32,35N,04E	St. Francois	X	X		B	X		
Izaak Walton Lake	L3	11.0	32,36N,31W	Vernon	X	X		B	X		
Jackass Bend	L3	200.0	32,51N,29W	Ray	X	X		B	X		X
Jackrabbit Lake	L3	28.0	15,47N,31W	Jackson	X	X		B	X		
Jamesport City Lake	L1	16.0	22,60N,26W	Daviess	X	X		B	X	X	
Jamesport Community Lake	L1	27.0	NE 20,60N,26W	Daviess	X	X		A	X	X	
Jasper Lake	L3	43.0	12,60N,06W	Lewis	X	X		A	X		
Jaycee Park Lake	L3	8.0	17,44N,12W	Cole	X	X		B	X		
Jo Lee Lake	L3	8.0	NESE 19,36N,5E	St. Francois	X	X		B	X		
Johnson Lake	L3	14.0	6,46N,15W	Cooper	X	X		B	X	X	
Junges Lake	L3	37.0	10,41N,21W	Benton	X	X		A	X		
Kahrs-Boger Park Lake	L3	2.0	15,44N,20W	Pettis	X	X		B	X		
Kellogg Lake	L3	22.0	34,29N,31W	Jasper	X	X		A	X		
King City Lake (South)	L1	29.0	SW SW34,61N,32W	Gentry	X	X		B	X	X	
King City New Reservoir	L1	25.4	28,61N,32W	Gentry	X	X		B	X	X	
King City Old Reservoir	L1	12.0	SW NE28,61N,32W	Gentry	X	X		B	X	X	
King Lake	L3	204.0	13,60N,32W	DeKalb	X	X		A	X	X	
Kiwanis Lake	L3	4.0	SW23,51N,9W	Audrain	X	X		B	X		
Klontz Lake	L3	14.0	02,39N,04W	Crawford	X	X		A	X		
Knox Village Lake	L3	3.0	1,47N,32W	Jackson	X	X		B	X		
Koeneman Park Lake	L3	5.0	8,46N,07E	St. Louis	X	X		B	X		
Kraut Run Lake	L3	164.0	Landgrant00056	St. Charles	X	X		B	X		
L. Prairie Comm. Lake	L3	95.0	SE SE21,38N,7W	Phelps	X	X		B	X		

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
La Plata City Lake	L1	89.0	14,60N,14W	Macon	X	X		B	X	X	
La Plata Lake	L1	22.0	9,60N,14W	Macon	X	X		B	X	X	
Lac Benet Lake	L3	7.0	20,37N,4E	St. Francois	X	X		A	X		
Lac Bergerac	L3	7.0	19,37N,4E	St. Francois	X	X		A	X		
Lac Bourbon	L3	7.0	19,37N,4E	St. Francois	X	X		A	X		
Lac Calista	L3	5.0	28,37N,4E	St. Francois	X	X		A	X		
Lac Capri	L3	106.0	30,37N,4E	St. Francois	X	X		A	X		
Lac Carmel	L3	55.0	18,37N,4E	St. Francois	X	X		A	X		
Lac Catalina	L3	5.0	19,37N,4E	St. Francois	X	X		A	X		
Lac Darcie	L3	4.0	19,37N,4E	St. Francois	X	X		A	X		
Lac Lafitte	L3	36.0	28,37N,4E	St. Francois	X	X		A	X		
Lac Marseilles	L3	48.0	29,37N,4E	St. Francois	X	X		A	X		
Lac Michel	L3	7.0	19,37N,4E	St. Francois	X	X		A	X		
Lac Renee	L3	4.0	20,37N,4E	St. Francois	X	X		A	X		
Lac Shayne	L3	76.0	25,37N,3E	Washington	X	X		A	X		
Lac Tiffany	L3	4.0	30,37N,4E	St. Francois	X	X		A	X		
Lac Veron	L3	3.0	30,37N,4E	St. Francois	X	X		A	X		
Lake Allaman	L3	6.0	NE 24,56N,30W	Clinton	X	X		A	X		
Lake Anne	L3	81.0	Landgrant02046	Ste. Genevieve	X	X		B	X		
Lake Annette	L3	65.0	01,44N,33W	Cass	X	X		B	X		
Lake Arrowhead	L3	101.0	18,54N,30W	Clinton	X	X		A	X		
Lake Arrowhead	L3	23.0	NW NE 31, 42N, 2E	Franklin	X	X		A	X		
Lake Boutin	L3	20.0	15,32N,14E	Cape Girardeau	X	X		A	X		
Lake Briarwood	L3	69.0	SW NE33,40N,04E	Jefferson	X	X		A	X		
Lake Buteo	L3	7.0	29,46N,24W	Johnson	X	X		B	X		
Lake Champetra	L3	58.0	NW13,45N,12W	Boone	X	X		A	X		
Lake Cherokee	L3	6.0	14,36N,03E	Washington	X	X		B	X		
Lake Contrary	L3	291.0	26,27,35,57N,36W	Buchanan	X	X		A	X		
Lake Girardeau	L3	144.0	SW SW09,30N,11E	Cape Girardeau	X	X		B	X		
Lake Innsbrook	L3	37.0	8,46N,1W	Warren	X	X		A	X		
Lake Jacomo	L3	998.0	NE NW11,48N,31W	Jackson	X	X		A	X		
Lake Killarney	L3	61.0	NW NW01,33N,04E	Iron	X	X		A	X		
Lake Lacawanna	L3	10.0	SE SE 11,38N,05E	St. Francois	X	X		B	X		
Lake Lincoln	L3	51.0	8,49N,1E	Lincoln	X	X		A	X		
Lake Lochaweeno	L3	39.0	24,47N,08W	Callaway	X	X		A	X		
Lake Loraine	L3	37.0	SUR 1970, 41N,04E	Jefferson	X	X		A	X		
Lake Lotawana	L3	487.0	SE SE29,48N,30W	Jackson	X	X		A	X		
Lake Lucern	L3	43.0	6,46N,1W	Warren	X	X		A	X		
Lake Luna	L3	23.0	4,44N,31W	Cass	X	X		B	X		
Lake Marie	L3	60.0	NE NW 36,66N,24W	Mercer	X	X		A	X		
Lake McGinness	L3	50.0	NW20,55N,30W	Clinton	X	X		B	X		
Lake Montowese	L3	39.0	27,43N,4E	Jefferson	X	X		A	X		
Lake Nehai Tonkayea	L3	228.0	NW NE11,55N,18W	Chariton	X	X		A	X		
Lake Nell	L3	26.0	22,47N,31W	Jackson	X	X		B	X		
Lake Niangua	L3	256.0	19,37N,17W	Camden	X	X		A	X		
Lake Northwood	L3	77.0	SE NE33,43N,05W	Gasconade	X	X		A	X		

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
Lake Ocie	L3	62.0	Landgrant00884	Ste. Genevieve	X	X		A	X		
Lake of the Oaks	L3	53.0	SE SW07,63N,06W	Clark	X	X		A	X		
Lake of the Ozarks	L2	59520.0	SE SE19,40N,15W	Camden	X	X		A	X		
Lake of the Woods	L3	3.0	NE SW 02,48N,12W	Boone	X	X		B	X		
Lake of the Woods	L3	7.0	11,48N,33W	Jackson	X	X		B	X		
Lake of the Woods Country Club Lake Number 2	L3	1.0	2,48N,12W	Boone	X	X		B	X		
Lake Paho	L3	273.0	NE SE25,65N,25W	Mercer	X	X		B	X		
Lake Sainte Louise	L3	71.0	Landgrant00929	St. Charles	X	X		A	X		
Lake Scioto	L3	5.0	30,38N,6W	Phelps	X	X		B	X		
Lake Serene	L3	59.0	NW NE03,42N,02E	Franklin	X	X		A	X		
Lake Sherwood	L3	120.0	SW SE11,45N,01W	Warren	X	X		A	X		
Lake Ski	L3	64.0	Landgrant00884	Ste. Genevieve	X	X		A	X		
Lake Springfield	L3	293.0	19,28N,21W	Greene	X	X		B	X		X
Lake St. Clair #1	L3	52.0	SW SE02,41N,01W	Franklin	X	X		A	X		
Lake St. Louis	L3	444.0	SUR 54 (NE SW26,47N,02E)	St. Charles	X	X		A	X		
Lake Taneycomo	L2	2118.6	SW NE8,23N,20W	Taney	X	X	X	A	X	X	
Lake Tapawingo	L3	83.0	NE NE34,49N,31W	Jackson	X	X		A	X		
Lake Tebo	L3	73.0	12,44N,22W	Pettis	X	X		B	X		
Lake Thunderbird	L3	33.0	NE,NW 5,41N,01E	Franklin	X	X		A	X		
Lake Thunderhead	L1	859.0	NE NE15,66N,19W	Putnam	X	X		A	X	X	
Lake Timber Ridge	L3	35.0	SW SE 16,43N,06W	Gasconade	X	X		A	X		
Lake Timberline	L3	39.0	24,38N,4E	St. Francois	X	X		A	X		
Lake Tishomingo	L3	120.0	Landgrant03027	Jefferson	X	X		A	X		
Lake Tom Sawyer	L3	4.0	4,54N,8W	Monroe	X	X		A	X		
Lake Torino	L3	7.0	20,42N,02E	Franklin	X	X		B	X		
Lake Tywappity	L3	43.0	SW SE08,29N,13E	Scott	X	X		A	X		
Lake Viking	L1	552.0	09,59N,28W	Daviess	X	X		A	X	X	
Lake Wanda Lee	L3	97.0	SUR 884, 37N, 7E	Ste. Genevieve	X	X		A	X		
Lake Wappapello	L2	7827.0	3,26N,7E	Wayne	X	X		A	X		
Lake Wauwanoka	L3	93.0	SE NW01,40N,04E	Jefferson	X	X		A	X		
Lake Winnebago	L3	272.0	NE NW09,46N,31W	Cass	X	X		A	X		
Lakes of Deerwood Number One	L3	8.0	32,42N.4E	Jefferson	X	X		B	X		
Lakeview Park Lake	L3	25.0	SW35,51N,09W	Audrain	X	X		B	X		
Lakewood Lakes	L3	279.0	NE NE07,48N,31W & SW SW 5, 48N, 31W	Jackson	X	X		A	X		
Lamar Lake	L1	148.0	SW NW32,32N,30W	Barton	X	X		B	X	X	
Lamine River C.A. Lakes	L3	37.0	25,26,27,36,46N,19W; 2,11,45N,19W; 7,18,45N,18W.	Cooper	X	X		B	X		
Lancaster City Lake - New	L1	56.0	23,66N,15W	Schuyler	X	X		B	X	X	
Lancaster Lake - Old	L1	23.0	SW NE14,66N,15W	Schuyler	X	X		B	X	X	
Lane Lake	L3	10.0	32,37N,01W	Washington	X	X		A	X		
Lawson City Lake	L1	25.0	31,54N,29W	Ray	X	X		A	X	X	
Leisure Lake	L3	38.0	NE SE05,61N,25W	Grundy	X	X		A	X		
Leisure Lake	L3	45.0	33,48N,08W	Callaway	X	X		A	X		
Lewis & Clark Lake	L3	403.0	27,28,33,55N,37W	Buchanan	X	X		A	X		
Lewis Lake	L3	6.0	SE, NE 10,26N,11E	Stoddard	X	X		B	X		
Lewistown Lake	L1	35.0	NW SW08,61N,08W	Lewis	X	X		B	X	X	

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
Liberty Park Lake	L3	1.0	04,45N,21W	Pettis	X	X		B	X		
Limpp Community State Lake	L3	27.0	29,61N,32W	Gentry	X	X		B	X		
Linneus Lake	L1	17.0	NE SW36,59N,21W	Linn	X	X		B	X	X	
Lions Lake	L3	11.0	16,44N,01W	Franklin	X	X		B	X		
Lions Lake	L3	13.0	26,46N,26W	Johnson	X	X		B	X		
Lisle Pond	L3	22.0	05,43N,33W	Cass	X	X		B	X		
Little Compton Lake	L3	36.0	29/32,55N,21W	Carroll	X	X		B	X		
Little Dixie Lake	L3	199.0	26,48N,11W	Callaway	X	X		B	X		
Loch Leonard	L3	27.0	SE18,46N,30W	Cass	X	X		B	X		
Loggers Lake	L3	21.0	10,15,31N,03W	Shannon	X	X		A	X		
Lone Jack Lake	L3	31.0	11,47N,30W	Jackson	X	X		B	X		
Lone Tree Lake	L3	21.0	N NE15,46N,6W	Montgomery	X	X		B	X		
Lonedell Lake	L3	40.0	16,40N,02E	Franklin	X	X		B	X		
Long Branch Lake	L2	2686.0	NW18,57N,14W	Macon	X	X		A	X	X	
Long Lake	L3	10.0	NW NW 03,25N,12E	Stoddard	X	X		B	X		
Longview Lake	L2	953.0	04,47N,32W	Jackson	X	X		A	X		
Lost Valley Lake	L3	37.0	SE NE17,43N,04W	Gasconade	X	X		A	X		
Lower Taum Sauk Lake	L3	200.0	33,33N,02E	Reynolds	X	X		B	X		
Lucky Clover Lake	L3	20.0	20,38N,04W	Crawford	X	X		A	X		
Mac Lake - Ziske	L3	28.0	SW NE 17,34N,05W	Dent	X	X		B	X		
Macon Lake	L3	189.0	SE NW17,57N,14W	Macon	X	X		B	X	X	
Malta Bend Community Lake	L3	4.0	25,51N,23W	Saline	X	X		B	X		
Manito Lake	L3	77.0	08,09,44N,17W	Moniteau	X	X		B	X		
Maple Leaf Lake	L3	127.0	04,48N,26W	Lafayette	X	X		B	X		
Marais Temps Clair	L3	725.7	19,48N,06E and 24,48N,5E	St. Charles	X	X		B	X		
Marceline Reservoir	L1	68.0	SE 28,57N,18W	Linn	X	X		B	X	X	
Mark Twain Lake	L2	18132.0	26,55N,07W	Ralls	X	X		A	X	X	
Marshall Habilitation Center Lake	L3	10.0	11,50N,21W	Saline	X	X		B	X		
Martin Lakes	L3	17.0	11,26N,11E	Stoddard	X	X		B	X		
Maysville Lake	L1	27.0	NE NE 4, 58N,31W	DeKalb	X	X		B	X	X	
Maysville Lake	L1	12.0	NW NE03,58N,31W	DeKalb	X	X		B	X	X	
McCormack Lake	L3	9.0	NW SW 24,25N,04W	Oregon	X	X		A	X		
McDaniel Lake	L1	218.0	NE SE26,30N,22W	Greene	X	X		B	X	X	
Melody Lake	L3	32.0	27,42N,03W	Franklin	X	X		A	X		
Memphis Lake	L1	253.0	15,65N,12W	Scotland	X	X		B	X	X	
Memphis Reservoir	L1	41.0	14,65N,12W	Scotland	X	X		B	X	X	
Middle Fork Water Company Lake	L1	98.0	6,63N,31W	Gentry	X	X		B	X	X	
Milan Lake North	L1	13.0	SE SE02,62N,20W	Sullivan	X	X		B	X	X	
Milan Lake South	L1	37.0	SE SE,02,62N,20W	Sullivan	X	X		B	X	X	
Mineral Lake	L3	8.0	1,42N,3W	Franklin	X	X		B	X		
Monopoly Marsh	L3	2329.0	16,27,8E	Wayne	X	X		B	X		
Monroe City Lake	L1	94.0	34,56N,7W	Ralls	X	X		A	X	X	
Monroe City Lake A	L1	17.0	NW NW13,56N,08W	Monroe	X	X		B	X	X	
Monroe Lake B	L1	60.0	30,56N,7W	Monroe	X	X		B	X	X	
Monsanto Lake	L3	18.0	SENW 20,36N,5E	St. Francois	X	X		A	X		
Monte Gurwit Lake	L3	11.0	4,50N,13W	Boone	X	X		B	X		

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
Montrose Lake	L3	1444.0	NE NW33,41N,27W	Henry	X	X		B	X		X
Morel Lake	L3	2.0	30,46N,24W	Johnson	X	X		B	X		
Mozingo Lake	L1	998.0	13,64N,35W	Nodaway	X	X		B	X	X	
New Cambria Lake	L1	9.0	SW NE07,57N,16W	Macon	X	X		B	X	X	
New City Lake	L3	78.0	27,64N,28W	Harrison	X	X		A	X		
New La Belle Lake	L1	18.0	16,61N,09W	Lewis	X	X		B	X	X	
New Marceline City Lake	L1	160.0	14,56N,19W	Chariton	X	X		B	X	X	
Nims Lake	L3	251.0	24,34N,6E	Madison	X	X		A	X		
Noblett Lake	L3	26.0	25,26N,11W	Douglas	X	X		A	X		
Nodaway Lake	L3	73.0	SW NE20,65N,35W	Nodaway	X	X		B	X		
Norfork Lake	L2	1000.0	21N,12W	Ozark	X	X		A	X		
North Lake	L3	38.0	28,45N,31W	Cass	X	X		B	X		
North Lake	L3	7.0	32,49N.7W	Callaway	X	X		B	X		
North Sever Lake	L3	12.5	20,63N,11W	Knox	X	X		B	X		
Odessa Lake	L1	87.0	NW NE15,48N,28W	Lafayette	X	X		B	X	X	
Odessa Lake (Old)	L1	22.0	NW NW14,48N,28W	Lafayette	X	X		B	X	X	
Old Bethany City Lake	L1	18.0	2,63N,28W	Harrison	X	X		B	X	X	
Old Lake	L1	28.0	30,53N,2W	Pike	X	X		B	X	X	
Old Lake	L1	20.0	15,57N,12W	Shelby	X	X		B	X	X	
Old Mud Lake	L3	126.0	16,20,21, 56N,36W	Buchanan	X	X		B	X		
Old Plattsburg Lake	L1	15.0	13,55N,32W	Clinton	X	X		B	X	X	
Old Reservoir	L1	20.0	3,53N,14W	Randolph	X	X		B	X	X	
Opossum Hollow Lake	L3	63.0	SW NE29,39N,03W	Crawford	X	X		A	X		
Oscie Ora Acres Lake	L3	50.0	10,28N,33W	Jasper	X	X		B	X		
Otter Lake	L3	250.0	17,24N,09E	Stoddard	X	X		B	X		
Painted Rock Lake	L3	5.0	11,42N,11W	Osage	X	X		B	X		
Palmer Lake	L3	102.0	22,36N,01E	Washington	X	X		A	X		
Panther Creek D-1 Lake	L3	28.0	32,65N,26W	Harrison	X	X		B	X		
Parker Lake #1	L3	20.0	SE SE 31,35N,09E	Perry	X	X		A	X		
Parker Lake No. 2	L3	80.0	NE SW32,35N,09E	Perry	X	X		A	X		
Parole Lake	L3	42.0	07,36N,01E	Washington	X	X		A	X		
Paul Herring Lake	L3	44.0	17,46N,9W	Callaway	X	X		B	X		
Peaceful Valley Lake	L3	158.0	NE NE25,42N,06W	Gasconade	X	X		A	X		
Peculiar Lake	L1	25.0	SE SW22,45N,32W	Cass	X	X		B	X	X	
Penn's Pond Lake	L3	8.0	06,34N,11W	Pulaski	X	X		B	X		
Perco Lakes	L3	21.7	SW5, NW8 ,34N,10E	Perry	X	X		B	X		
Perry C.A. Lakes	L3	16.4	28.33.34.36.48N,24W;30,48N,23W	Johnson	X	X		B	X		
Perry City Lake	L1	18.0	34,54N,7W	Ralls	X	X		B	X	X	
Perry City Lake Upper	L1	7.0	34,54N,7W	Ralls	X	X		B	X	X	
Perry County Community Lake	L3	89.0	SW NE22,35N,10E (SUR 856)	Perry	X	X		B	X		
Perry Phillips Lake	L3	41.0	32,48N,12W	Boone	X	X		B	X		
Pershing St. Park Lakes	L3	12.0	2,11,57N,21W	Linn	X	X		A	X		
Peters Lake	L3	62.0	NW NW4,50N,16W	Howard	X	X		B	X		
Pike Lake	L3	17.0	02,59N,25W	Livingston	X	X		A	X		
Pim Lake	L3	7.0	SWNW 20,36N,5E	St. Francois	X	X		A	X		
Pinewoods Lake	L3	22.0	07,26N,03E	Carter	X	X		B	X		

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
Pinnacle Lake	L3	115.0	SE NE24,47N,05W	Montgomery	X	X		A	X		
Plattsburg 6 Mi. Lane Lk.	L3	57.0	SW SE11,55N,32W	Clinton	X	X		B	X	X	
Pleasant Hill Lake	L1	91.0	SW SE01,46N,31W	Cass	X	X		B	X	X	
Plover Lake	L3	14.0	15,47N,31W	Jackson	X	X		B	X		
Poague C.A. Lakes	L3	80.0	19,30,42N,26W, 24,42N,27W	Henry	X	X		B	X		
Pomme de Terre Lake	L2	7675.0	2,36N,22W	Polk	X	X		A	X		
Pond Number 1	L3	3.0	8,48N,7W	Callaway	X	X		B	X		
Pond Number 2	L3	1.0	8,48N,7W	Callaway	X	X		B	X		
Pond Number 2	L3	4.0	32,43N,25W	Henry	X	X		B	X		
Pond Number 3	L3	1.0	8,48N,7W	Callaway	X	X		B	X		
Pond Number 3	L3	3.0	32,43N,25W	Henry	X	X		B	X		
Pond Number 4	L3	1.0	8,48N,7W	Callaway	X	X		B	X		
Pond Number 5	L3	1.0	5,48N,7W	Callaway	X	X		B	X		
Pond Number 6	L3	1.0	6,48N,7W	Callaway	X	X		B	X		
Pond Number 7	L3	1.0	5,48N,7W	Callaway	X	X		B	X		
Pond Number 8	L3	1.0	16,48N,7W	Callaway	X	X		B	X		
Pony Express Lake	L3	256.0	33,58N,31W	DeKalb	X	X		A	X		
Port Hudson Lake	L3	53.0	16,43N,3W	Franklin	X	X		B	X		
Port Perry Lake	L3	155.0	NE SE08,34N,09E	Perry	X	X		B	X		
Potosi Lake	L3	20.0	SW NW 35,37N,03E	Washington	X	X		A	X		
Prairie Lee Lake	L3	144.0	NE SW27,48N,31W	Jackson	X	X		A	X		
Primrose Lake	L3	33.0	23,38,04E	St. Francois	X	X		B	X		
Radio Springs Lake	L3	8.0	08,35N,31W	Vernon	X	X		B	X		
Railroad Lake	L3	8.0	34,45N,15W	Moniteau	X	X		B	X		
Raintree Lake	L3	248.1	06,46N,31W	Cass	X	X		A	X		
Raintree Plantation Lake	L3	115.0	29,41N,04E	Jefferson	X	X		A	X		
Ray County Community Lake	L3	23.0	13,52N,28W	Ray	X	X		A	X		
Raymond Claus Lake	L3	8.7	SE SE17,27N,11E	Stoddard	X	X		B	X		
Rice Lake East	L3	11.0	09,27N,11E	Stoddard	X	X		B	X		
Rice Lake West	L3	4.0	SENE 9,27N,11E	Stoddard	X	X		B	X		
Rinquelin Trail Community Lake	L3	27.0	NE 29,39N,11W	Maries	X	X		B	X		
Ripley Lake	L3	18.0	10,23N,01E	Ripley	X	X		A	X		
Riss Lake	L3	134.0	SW SW25,51N,33W	Platte	X	X		B	X		
Roach Lake	L3	106.0	30,57N,23W	Livingston	X	X		A	X		
Roby Lake	L3	10.0	34/35,33N,11W	Texas	X	X		A	X		
Rock House Lake	L1	62.0	NE SW 36,65N,27W	Harrison	X	X		A	X	X	
Rocky Fork Lake	L3	60.0	NW SE31,50N,12W	Boone	X	X		B	X		
Rocky Hollow Lake	L3	20.0	SE33,53N,30W	Clay	X	X		B	X		
Rothwell Lake	L3	25.0	3,53N,14W	Randolph	X	X		B	X		
Salisbury City Lake (Pine Ridge Lake)	L3	25.0	15,53N,17W	Chariton	X	X		B	X		
Santa Fe Lake	L3	29.0	5,60N,14W	Macon	X	X		A	X		
Savannah City Reservoir	L1	20.0	07,59N,35W	Andrew	X	X		A	X	X	
Sayersbrook Lake	L3	36.0	NE SE28,38N,01E	Washington	X	X		B	X		
Schell Lake	L3	371.0	6,37N,28W	St. Clair	X	X		A	X		
Schuyler Co. PWSD #1 Lake	L1	33.0	SE SE04,64N,015W	Schuyler	X	X		B	X	X	
Sears Community Lake	L3	32.0	18,63N,19W	Sullivan	X	X		A	X		

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
See Tal Lake	L3	11.0	NW NW01,45N,05W	Gasconade	X	X		B	X		
Sequiota Park Lake	L3	3.0	09,28N,21W	Greene	X	X		B	X		
Settles Ford C.A. Lakes	L3	968.0	33,43N,29W;4,5,8-10,15-18,42N,29 W;13,42N,30W	Bates	X	X		B	X		
Seven Springs Lake	L3	18.0	23-24,36N,06W	Phelps	X	X		A	X		
Shawnee Lake - Turner	L3	15.0	SW NW 17,34N,05W	Dent	X	X		B	X		
Shelbina Lake	L1	52.0	20,57N,10W	Shelby	X	X		B	X	X	
Shelbyville Lake	L1	32.0	SE SE19,58N,10W	Shelby	X	X		B	X	X	
Shepard Mountain Lake	L1	21.0	01,33N,03E	Iron	X	X		B	X	X	
Silver Lake	L3	54.0	SW SW16,46N,32W	Cass	X	X		B	X		
Silver Lake-Levee 3	L3	2464.0	06,55N,20W	Chariton	X	X		B	X		
Simpson Park Lake	L3	64.0	16,44N,5E	St. Louis	X	X		B	X		
Sims Valley Community Lake	L3	42.0	17,20,27N,08W	Howell	X	X		A	X		
Smithville Lake	L2	7738.0	13,53N,33W	Clay	X	X		A	X	X	
Snow Hollow Lake	L3	31.0	26/27,34N,03E	Iron	X	X		B	X		
South Lake	L3	2.0	8,48N,7W	Callaway	X	X		B	X		
South Pool-Levee 3	L3	263.0	1,2,11,12,13,55N,21W	Chariton	X	X		B	X		
Spencer Lake	L3	7.0	NW19,66N,14W	Schuyler	X	X		B	X		
Sportsman Lake	L1	7.0	NE SE,04,49N,06W	Montgomery	X	X		B	X	X	
Spring Fork Lake	L1	178.0	NE SW21,44N,21W	Pettis	X	X		B	X	X	
Spring Lake	L3	87.0	10,61N,16W	Adair	X	X		A	X		
Spring Lake	L3	5.0	33,40N,4E	Jefferson	X	X		B	X		
Squaw Creek NWR Pools	L3	1230.0	36,61N,39W	Holt	X	X		B	X		
Sterling Price Community Lake	L3	23.0	17,53N,17W	Chariton	X	X		A	X		
Stockton Lake	L2	23680.0	NE NE15,34N,26W	Cedar	X	X		A	X	X	
Strip Pit 1	L3	11.0	32,43N,25W	Henry	X	X		B	X		
Strip Pit 1	L3	7.0	9,38N,32W	Bates	X	X		B	X		
Strip Pit 2	L3	5.0	9,38N,32W	Bates	X	X		B	X		
Strip Pit 3	L3	6.0	9,38N,32W	Bates	X	X		B	X		
Strip Pit 4	L3	4.0	9,38N,32W	Bates	X	X		B	X		
Strip Pit 5	L3	6.0	4,38N,32W	Bates	X	X		B	X		
Strip Pit 6	L3	2.0	4,38N,32W	Bates	X	X		B	X		
Strobel Lake	L3	33.0	SW SW 01,27N,09E	Stoddard	X	X		B	X		
Sugar Creek Lake	L1	308.0	NE SE16,54N,14W	Randolph	X	X		B	X	X	
Sullivan City Lake	L3	5.0	NE NW 20,40N,02W	Crawford	X	X		B	X		
Summerset & Fisherman's Lakes	L3	75.0	SW15,39N,04E	Jefferson	X	X		A	X		
Sunfish Lake	L3	27.0	SUR 3097, 155, 1840, 47N,07E	St. Louis	X	X		B	X		
Sunnen Lake	L3	206.0	SW SE04,37N,01E	Washington	X	X		A	X		
Sunrise Lake	L3	21.0	36,39N,4E	Jefferson	X	X		A	X		
Sunset Lake	L3	6.0	13,44N,12W	Cole	X	X		B	X		
Sunset Lake	L3	50.2	NW SE33,39N,07E	Ste. Genevieve	X	X		B	X		
Sunshine Lake	L3	500.0	19,29,32,51N,27W	Ray	X	X		A	X		X
Swan Lake-Levee 5	L3	1425.0	10,55N,21W	Chariton	X	X		B	X		
Table Rock Lake	L2	41747.0	SW NW22,22N,22W	Stone	X	X		A	X		
Tarsney Lake	L3	17.0	22,48N,30W	Jackson	X	X		A	X		
Tea Lake No. 1	L3	25.0	08,41N,04W	Gasconade	X	X		B	X		

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
Teal Lake	L3	84.0	36,51N,9W	Audrain	X	X		B	X		
Tebo Freshwater Lake	L3	250.0	SW SW25,43N,25W	Henry	X	X		B	X		
Ten Mile Pond	L3	70.0	07,04,03,24N,16E	Mississippi	X	X		B	X		
Thirtyfour Corner Blue Hole	L3	9.0	35,25N,17E	Mississippi	X	X		B	X		
Thomas Hill Reservoir	L2	4400.0	NE SE24,55N,16W	Randolph	X	X		A	X	X	X
Tobacco Hills Lake	L3	16.0	NW11,53N,35W	Platte	X	X		B	X		
Tom Bird Blue Hole	L3	6.0	29,27N,18E	Mississippi	X	X		B	X		
Treeline Lake	L3	30.0	30,40N,16W	Camden	X	X		B	X		
Trenton Lake Lower	L1	103.0	SW 15,61N,24W	Grundy	X	X		B	X	X	
Trenton Lake Upper	L1	68.0	NE SE15,61N,24W	Grundy	X	X		B	X	X	
Tri-City Lake	L3	27.0	24,51N,12W	Boone	X	X		B	X		
Turtle Rock Lake	L3	2.0	8,48N,7W	Callaway	X	X		B	X		
Twin Borrow Pits	L3	44.0	13,20N,13E	Pemiscot	X	X		B	X		
Twin Lake	L3	49.0	NW NW31,66N,23W	Mercer	X	X		B	X		
Twin Lake Number 1	L3	1.0	8,48N,7W	Callaway	X	X		B	X		
Twin Lake Number 2	L3	1.0	8,48N,7W	Callaway	X	X		B	X		
Twin Lakes	L3	22.9	SW SW,22,48N,13W	Boone	X	X		A	X		
Union City Lake	L3	5.0	27,43N,01W	Franklin	X	X		B	X		
Unionville (Old) Lake	L1	13.0	34,66N,19W	Putnam	X	X		A	X	X	
Unionville Reservoir	L3	74.0	27,66N,19W	Putnam	X	X		B	X		
Unity Lake Number One	L1	19.0	25,48N,32W	Jackson	X	X		B	X	X	
Unity Lake Number Two	L1	26.0	24,48N,32W	Jackson	X	X		B	X	X	
Unnamed Lake	L3	1.0	16,45N,32W	Cass	X	X		B	X		
Unnamed Lake	L3	6.0	18,47N,31W	Jackson	X	X		B	X		
Unnamed Lake	L3	8.0	15,42N,4W	Franklin	X	X		B	X		
Unnamed Lake	L3	2.0	2,47N,32W	Jackson	X	X		B	X		
Unnamed Lake	L3	6.0	10,38N,32W	Bates	X	X		B	X		
Unnamed Lake	L3	37.4	21,39N,5E	Jefferson	X	X		B	X		
Valle Lake	L3	42.0	31,39N,05E	Jefferson	X	X		A	X		
Van Meter St. Park Lake	L3	8.0	24,52N,22W	Saline	X	X		A	X		
Vandalia Community Lake	L3	35.0	SE35,52N,06W	Audrain	X	X		B	X		
Vandalia Reservoir	L1	28.0	NE NE12,53N,05W	Pike	X	X		B	X	X	
Wahoo Lake	L3	10.0	14,38N,04E	St. Francois	X	X		B	X		
Wakonda Lake	L3	78.0	13,14,60N,06W	Lewis	X	X		A	X		
Walt Disney Lake	L3	19.0	31,57N,18W	Linn	X	X		A	X		
Watkins Mill Lake	L3	87.0	NW 22,53N,30W	Clay	X	X		A	X		
Waukomis Lake	L3	76.0	SW 17,51N,33W	Platte	X	X		A	X		
Weatherby Lake	L3	185.0	SW SE15,51N,34W	Platte	X	X		A	X		
Welch Lake	L3	7.0	2,48N,12W	Boone	X	X		B	X		
Wellsville City Lake	L1	12.0	NW SE 33,50N,06W	Montgomery	X	X		A	X	X	
West Arrowhead Lake	L3	58.0	18,23N,08W	Howell	X	X	X	B	X		
Whispering Valley Lakes	L3	30.0	35,44N,03W	Franklin	X	X		A	X		
Whiteside Lake	L3	23.0	Landgrant01686	Lincoln	X	X		B	X		
Wildwood Lake	L3	17.0	NE 09,48N,32W	Jackson	X	X		B	X		
Willow Brook Lake	L1	53.0	SE NE 04,58N,13W	DeKalb	X	X		B	X	X	
Willow Lake	L3	29.0	27-34,34N,32W	Vernon	X	X		B	X		

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

WATER BODY	CLAS	ACRES	LOCATION	COUNTY(IES)	LWP	WWH	CDH	WBC	SCR	DWS	IND
Willowwood Lake	L3	45.0	26 & 35,48N,05E	St. Charles	X	X		B	X		
Windsor Ferrington Park Lake	L3	16.0	6,43N,23W	Pettis	X	X		B	X		
Windy Lake	L3	13.0	6,48N,7W	Callaway	X	X		B	X		
Winegar Lake	L3	8.0	18,43N,13W	Cole	X	X		B	X		
Wing Lake	L3	19.9	NW SW 14, 35N,03E	Washington	X	X		A	X		
Wolf Bayou Mud Bayou	L3	37.0	04,19N,13E	Pemiscot	X	X		B	X		
Wood Lake	L3	8.0	8,57N,12W	Shelby	X	X		B	X		
Worth County Community Lake	L3	17.0	32,65N,32W	Worth	X	X		B	X		
Wyaconda Lake	L1	9.0	NW NW33,65N,09W	Clark	X	X		B	X	X	

LWP-Livestock and Wildlife Protection
WWH-Protection of Warm Water Habitat and Human Health Protection (HHP)
CDH-Cold Water Habitat
WBC-Whole Body Contact Recreation
SCR-Secondary Contact Recreation
DWS-Drinking Water Supply
IND-Industrial Water Supply

Dawson Metal Products Camdenton Facility #2
Camdenton, Mo
Site Investigation
FPO, 2019

Enter your search here Search

☑ US Patents/Apps ☐ Other

SEARCH

RESEARCH

MPEP 2.0

TOOLS & RESOURCES

ACCLAIM IP

HELP

Title:

CONVERTIBLE RAIL-HIGHWAY VEHICLE

United States Patent 3701323

Abstract:

A conventional highway bus is adapted for alternate use on highways and railways by providing rail conversion units located adjacent respective road wheels of the bus. The conversion units raise the front of the bus on rail wheels to a position which deactivates the front road wheels and the rear of the bus is supported by rail wheels only to the extent that it is guided on the rails but propulsion and some braking is obtained through contact between the rails and the rear road wheels. Air bellows suspension is provided on the rail conversion units to simulate road driving characteristics and hydraulic cylinders permit the rail wheels to be withdrawn upwardly out of service during road operation.

Inventors:

COX EDWIN W

Application Number:

05/097406

Publication Date:

10/31/1972

Filing Date:

11/16/1970

Export Citation:

Click for automatic bibliography generation

Assignee:

W. T. Cox Company (Camdenton, MO)

Primary Class:

105/72.2

Other Classes:

104/245

International Classes:

B60F1/04; (IPC1-7): B61D15/00; B61F9/00; B62D61/12

Field of Search:

105/215C 104

View Patent Images:

Download PDF 3701323 PDF help

US Patent References:

3342141	Convertible rail-highway vehicle truck	1967-09-19	Browne
3263628	Bogie suspension for convertible railway-highway vehicle	1966-08-02	Grove et al.
3228350			Cox

	Guiding apparatus for operating highway vehicles on railroad tracks	1966-01-11	
1973494	Convertible motor vehicle	1934-09-11	McCullough et al.

Primary Examiner:

Forlenza, Gerald M.

Assistant Examiner:

Beltran, Howard

Claims:

What I claim and desire to secure by Letters Patent is

1. A passenger carrying vehicle for alternate use on rails and on the highway comprising:

2. The vehicle as set forth in claim 1, wherein:

3. The vehicle as set forth in claim 1, wherein:

4. The vehicle as set forth in claim 3, wherein:

5. The vehicle as set forth in claim 1 wherein:

6. The vehicle as set forth in claim 1, including shock absorbers operably mounted between each of said rail conversion units and said frame.

7. In combination with a road passenger carrying vehicle having air suspension and a frame:

Description:

This invention relates to convertible rail-highway vehicles and more particularly to such vehicles particularly adapted to carry passengers alternately over roads and rails at relatively high speed in comfort.

Vehicles adapted to be used alternately on rails and paved roadways are known. However, such vehicles generally have been used in connection with trucks, construction or railroad maintenance equipment and do not meet the requirements of speed and comfort for commercial passenger service. This invention calls for the use of well known commercial buses, such as those commonly used by public transit companies, which have been converted to alternate use on standard rails with conversion units compatable with, and operated partially through, the standard air suspension system carried by the bus.

It is the principal objects of the present invention to provide a vehicle for alternate use on rails and on roads which is

suitable for carrying large numbers of passengers at relatively high speeds and in comfort; to provide such a vehicle that utilizes the conventional power train to the rear wheels for driving and partially braking the vehicle while on rails; to provide such apparatus wherein the rail units are easily withdrawn into an inoperative position when the vehicle is used on roads; and to provide such a vehicle which utilizes a portion of the existing suspension system for the rail mechanism function.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

FIG. 1 is a side elevational view showing a rail bus embodying this invention operating upon rails.

FIG. 2 is a fragmentary cross-sectional view taken on the line 2--2, FIG. 1, on an enlarged scale, showing apparatus for converting the bus to rail operation.

FIG. 3 is a fragmentary side elevation on the scale of FIG. 2 particularly showing the relationship between the rear bus wheel suspension and the rear rail converting structure.

FIG. 4 is a schematic diagram of the hydraulic and compressed air systems used in connection with the convertible rail bus.

Referring to the drawings in more detail:

The reference numeral 1 generally indicates a passenger carrying vehicle, such as a standard inter-city coach manufactured by General Motors Corporation, having a rear engine and air suspension. In the practice of this invention, the coach or vehicle 1 is convertible to run alternately on standard railroad tracks and on the road.

The vehicle 1 has a frame 2, front road wheels 3 and rear driven wheels 4. The rear wheels 4 are dual, including inner tires 5 and outer tires 6 which, during normal road operation, all contact the ground. The inner tires 5 are spaced apart a distance suitable for simultaneous engagement with respective rails 7 and 8 of standard 561/2 inch gauge. Referring particularly to FIG. 3, radius rods 9 and 10, typical of other wheel structure, are pivotally connected at one end thereof to a portion of the frame 2 at 11 and 12. At the other end thereof, the rods 9 and 10 are connected to suspension support 13 which is secured to the rear axle housing 14.

Vertical loads are supported by rubber and nylon fabric air bellows 15 installed between the suspension support 13 and the coach frame 2. In normal use the pressure in the air bellows 15 is varied automatically in proportion to vehicle load by conventional height control valves 16 (FIG. 4), two of which are located at the rear of the bus and one normally at the front. The height control valves 16 each include a valve lever 17 connected by suitable links (not shown) to the axle for altering the pressure in the bellows 15 as vehicle load varies. It is noted that the height control valves 16 are of the known type which do not respond to rapid relative motion between the axles and frame, such as that caused by road bumps. Telescoping type double-acting shock absorbers 18 are mounted at the ends of each axle for reducing the transmission of road shocks to the vehicle body.

The air suspension system of the vehicle 1 includes a pump 19 which maintains air under a predetermined pressure in a suspension air tank 20 through a suitable regulating valve 21 and check valve 22. Suitable air lines 23 conduct air

under pressure from the suspension air tank 20 through the height control valve 16 and into distribution lines 24 where the air is introduced into the respective bellows 15.

The rail conversion units are broadly designated 25 and comprise a single vertical leg 26 incorporating an hydraulic cylinder adapted to vertically raise and lower a piston rod or ram 27. A rocker arm 28 is centrally pivoted about the lower end of the ram 27, permitting limited rotation in a vertical plane. Suitable rail wheels 29 and 30 are mounted in tandom on the ends of the rocker arm 28 and thereby have some freedom to ride independently over obstacles or rail vertical discontinuties. The rocker arm 28 is also free to rotate over a limited range with the ram 27 in a horizontal plane whereby cooperating rail wheels are oriented in steer around curves. The applied steering sideload imparted through the rail wheel flanges by the outside rail on a curve is transmitted across to the inside wheels through twin lateral tie rods 31 (FIG. 2) connected to the opposite rocker arms.

Radius rods 32 and 33 are pivotally connected at opposite ends thereof, in the manner described in connection with the radius rods 9 and 10, to support the leg 26 and rail wheels associated therewith, but permit substantial vertical motion with respect to the bus frame 2.

A suspension support 34 is secured to the leg 26 and extends longitudinally forwardly and rearwardly with respect to the vehicle 1 forming platforms for receiving the lower ends of the air bellows 35. The upper ends of the air bellows 35 are fixed with respect to the frame 2, whereby air cushioned support is provided for the rail wheels, as well as the road wheels.

Referring to FIG. 4, air distribution lines 24 of the conventional bus air suspension system is connected through lines 36 to height control valves 37, comparable to the valves 16 noted above. The valves 37 are operated through suitable sensing devices 38 which, in this example, include rods 39 which monitor the relative positions between the frame 2 and the respective leg 26. The rods 39 operate through contact with opposite ends of a rigid cross member 40 which provides rigid structural integration between opposite legs 26. The height control valves 37 feed compressed air, as necessary, into the respective air bellows 35 through suitable air distribution lines 41. The cross member 40 also serves to provide contact points for shock absorbers 42 which act in conjunction with the bellows 35 to impart riding characteristics to the frame 2 similar to that which would be experienced through the conventional road suspension system, even though the vehicle is supported primarily on rails.

The hydraulic cylinders associated with the legs 26 are operated through an hydraulic system consisting of a pump 43, overload bypass valve 44, reservoir 45, distribution lines 46 and individual control valves 47. Controls may be conveniently placed within reach of the bus operator. During road operation, the rail wheels 29 and 30 are withdrawn to the position indicated by the broken lines in FIG. 3. A disc brake 48 is installed on each of the rail wheels and may be operated through the bus air brake system with the regular operator brake pedal (not shown).

The rail conversion units may be installed in a conventional bus with a minimum of alteration in standard equipment. In operation, when it is desired to move the vehicle along rails, alignment is made over the rails and front rail conversion units are actuated to lift the front of the bus some 3 to 4 inches above rail level. The front road suspension system is preferably locked in an elevated condition by suitable hook structure (not shown). The rear rail conversion units are extended downwardly to a point where the bus rear axle load is generally equally shared between the rear rail units and the bus rear wheels, causing substantial contact between the inner tires 5 and the rails 7 and 8, FIG. 2. The contact between the inner tires 5 and the rail is utilized to accelerate the bus through the conventional power train while braking is accomplished through the standard rear brakes of the bus in combination with the braking force

available through the disc brakes 48 on the eight rail contacting wheels. The relative loads assumed by the bellows 15 and 35 at the rear of the bus may be easily controlled to maintain the optimum support distribution between rail wheel support and rear tire contact.

It is to be understood that while one form of this invention has been illustrated and described, it is not to be limited thereto except insofar as such limitations are included in the following claims.

<- Previous Patent (FLUID DAMPENED RAILW...) | Next Patent (BOXED PRODUCT CARLOA...) ->

Home
Search
Services
Communities
Help
Contact us
Advertise on this Site

© 2004-2019 FreePatentsOnline.com. All rights reserved. Privacy Policy & Terms of Use. A SumoBrain Solutions Company

Missouri Department of Conservation

Missouri Department of Conservation's Mission is to protect and manage the forest, fish, and wildlife resources of the state and to facilitate and provide opportunities for all citizens to use, enjoy and learn about these resources.

Dawson Metal Products
Camdenton Facility #2
Camdenton, Mo
Site Investigation
MDC, 2018

Natural Heritage Review Level Three Report: Species Listed Under the Federal Endangered Species Act

There are records for species listed under the Federal Endangered Species Act, and possibly also records for species listed Endangered by the state, or Missouri Species and/or Natural Communities of Conservation Concern within or near the the defined Project Area. Please contact the U.S. Fish and Wildlife Service and the Missouri Department of Conservation for further coordination.

Foreword: Thank you for accessing the Missouri Natural Heritage Review Website developed by the Missouri Department of Conservation with assistance from the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, Missouri Department of Transportation and NatureServe. The purpose of this website is to provide information to federal, state and local agencies, organizations, municipalities, corporations and consultants regarding sensitive fish, wildlife, plants, natural communities and habitats to assist in planning, designing and permitting stages of projects.

PROJECT INFORMATION

Project Name and ID Number: Dawson Metal Products Camdenton Facility #2, The department needs to know if there are any sensitive areas that should be addressed. #4129
Project Description: S26, T38N, R17W, lat/long: 37.998608/-92.763877, Lake of the Ozarks, Camden County
Project Type: Hazardous Waste Clean-up, Site Remediation, and Reclamation, Superfund site (State or Federal, proposed or designated)
Contact Person: Amanda Branson
Contact Information: amanda.branson@dnr.mo.gov or 573-751-9021

PRELIMINARY REPORT

Disclaimer: The NATURAL HERITAGE REVIEW REPORT produced by this website identifies if a species tracked by the Natural Heritage Program is known to occur within or near the area submitted for your project, and shares suggested recommendations on ways to avoid or minimize project impacts to sensitive species or special habitats. If an occurrence record is present, or the proposed project might affect federally listed species, the user must contact the Department of Conservation or U.S. Fish and Wildlife Service for more information. The Natural Heritage Program tracks occurrences of sensitive species and natural communities where the species or natural community has been found. Lack of an occurrence record does not mean that a sensitive plant, animal or natural community is not present on or near the project area. Depending on the project, current habitat conditions, and geographic location in the state, surveys may be necessary. Additionally, because land use conditions change and animals move, the existence of an occurrence record does not mean the species/habitat is still present. Therefore, Reports include information about records near but not necessarily on the project site.

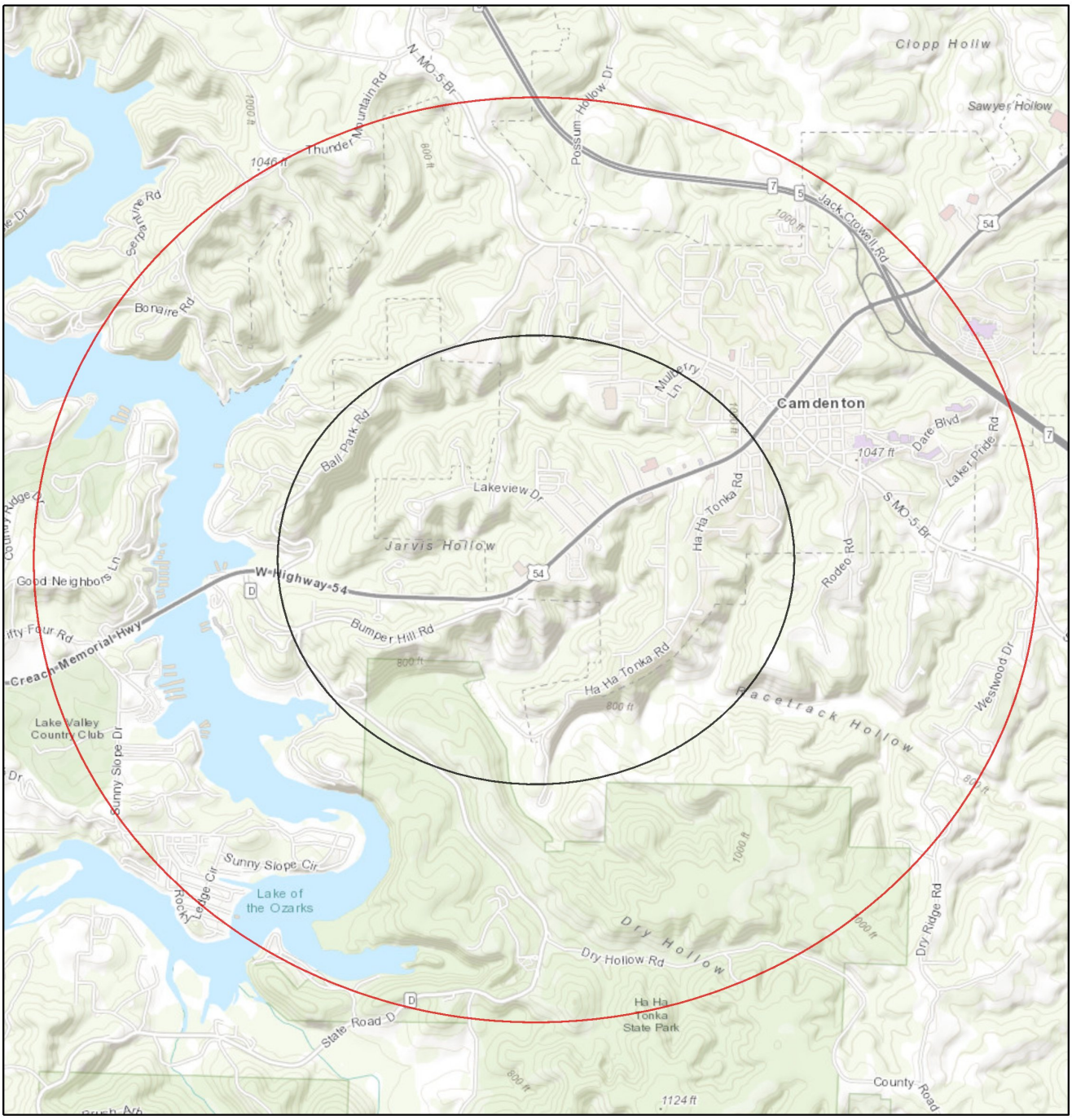
The Natural Heritage Report is not a site clearance letter for the project. It provides an indication of whether or not public lands and sensitive resources are known to be (or are likely to be) located close to the proposed project. Incorporating information from the Natural Heritage Program into project plans is an important step that can help reduce unnecessary impacts to Missouri's sensitive fish, forest and wildlife resources. However, the Natural Heritage Program is only one reference that should be used to evaluate potential adverse project impacts. Other types of information, such as wetland and soils maps and on-site inspections or surveys, should be considered. Reviewing current landscape and habitat information, and species' biological characteristics would additionally ensure that Missouri Species of Conservation Concern are appropriately identified and addressed in planning efforts.

U.S. Fish and Wildlife Service – Endangered Species Act (ESA) Coordination: Lack of a Natural Heritage Program occurrence record for federally listed species in your project area does not mean the species is not present, as the area may never have been surveyed. Presence of a Natural Heritage Program occurrence record does not mean the project will result in negative impacts. The information within this report is not intended to replace Endangered Species Act consultation with the U.S. Fish and Wildlife Service (USFWS) for listed species. Direct contact with the USFWS may be necessary to complete consultation and it is required for actions with a federal connection, such as federal funding or a federal permit; direct contact is also required if ESA concurrence is necessary. Visit the USFWS Information for Planning and Conservation (IPaC) website at https://ecos.fws.gov/ipac/ for further information. This site was developed to help streamline the USFWS environmental review process and is a first step in ESA coordination. The Columbia Missouri Ecological Field Services Office may be reached at 573-234-2132, or by mail at 101 Park Deville Drive, Suite A, Columbia, MO 65203.

Transportation Projects: If the project involves the use of Federal Highway Administration transportation funds, these recommendations may not fulfill all contract requirements. Please contact the Missouri Department of Transportation at 573-526-4778 or www.modot.mo.gov/ehp/index.htm for additional information on recommendations.

PRELIMINARY REPORT

lenton Facility #2, The department needs to know if there are any sensitive ar



March 28, 2018

1:36,897

0 0.3 0.6 1.2 mi

0 0.5 1 2 km

Project Boundary

Buffered Project Boundary

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Species or Communities of Conservation Concern within the Area:

There are records for species listed under the Federal Endangered Species Act, and possibly also records for species listed Endangered by the state, or Missouri Species and/or Natural Communities of Conservation Concern within or near the the defined Project Area. Please contact the U.S. Fish and Wildlife Service and the Missouri Department of Conservation for further coordination.

MDC Natural Heritage Review
Resource Science Division
P.O. Box 180
Jefferson City, MO
65102-0180
Phone: 573-522-4115 ext. 3182
NaturalHeritageReview@mdc.mo.gov

U.S. Fish and Wildlife Service
Ecological Service
101 Park Deville Drive
Suite A
Columbia, MO
65203-0007
Phone: 573-234-2132

Other Special Search Results:

The project occurs on or near public land, Camdenton CSC, Ha Ha Tonka State Park, please contact MDC, DNR.

Your project is near a designated Natural Area Ha Ha Tonka Karst NA, DNR. Please contact MDC Natural Areas Coordinator, 573-751-4115 for more information.

Project Type Recommendations:
Hazardous Waste Clean-up, Site Remediation, and Reclamation: Superfund Site should be managed to minimize erosion and sedimentation/runoff to nearby streams and lakes, including adherence to any “Clean Water Permit” conditions. Project design should include stormwater management elements that assure storm discharge rates to streams for heavy rain events will not increase from present levels. Revegetate disturbed areas to minimize erosion using native plant species compatible with the local landscape and wildlife needs. Annual ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crownvetch and sericea lespedeza. Best management recommendations relating to streams and rivers may be found at: https://mdc.mo.gov/property/pond-stream-care/streams-construction-best-practices.

Project Location and/or Species Recommendations:

Endangered Species Act Coordination - Indiana bats *(Myotis sodalis*, federal- and state-listed endangered) and **Northern long-eared bats** (*Myotis septentrionalis,* federal-listed threatened) may occur near the project area. Both of these species of bats hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in wooded areas, often riparian forests and upland forests near perennial streams. During project activities, avoid degrading stream quality and where possible leave snags standing and preserve mature forest canopy. Do not enter caves known to harbor Indiana bats or Northern long-eared bats, especially from September to April. **If any trees need to be removed for your project, please contact the U.S. Fish and Wildlife Service (Ecological Services, 101 Park Deville Drive, Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132 ext. 100 for Ecological Services) for further coordination under the Endangered Species Act.**

The project location submitted and evaluated is within the geographic range of nesting Bald Eagles in Missouri. Bald Eagles (*Haliaeetus leucocephalus*) may nest near streams or water bodies in the project area. Nests are large and fairly easy to identify. Adults begin nesting activity in late December and January and young birds leave the nest in late spring to early summer. While no longer listed as endangered, eagles continue to be protected by the federal government under the Bald and Golden Eagle Protection Act. Work managers should be alert for nesting areas within 1500 meters of project activities, and follow federal guidelines at: http://www.fws.gov/midwest/MidwestBird/EaglePermits/index.html if eagle nests are seen.

PRELIMINARY REPORT

The project location submitted and evaluated is within the range of the Gray Myotis (i.e., Gray Bat) in Missouri. Depending on habitat conditions of your project's location, Gray Myotis (*Myotis grisescens*, federal and state-listed endangered) could occur within the project area, as they forage over streams, rivers, lakes, and reservoirs. Avoid entry or disturbance of any cave inhabited by Gray Myotis and when possible retain forest vegetation along the stream and from the cave opening to the stream. See http://mdc.mo.gov/104 for best management recommendations.

Invasive exotic species are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment. Please inspect and clean equipment thoroughly before moving between project sites. See http://mdc.mo.gov//9633 for more information.

- Remove any mud, soil, trash, plants or animals from equipment before leaving any water body or work area.
- Drain water from boats and machinery that have operated in water, checking motor cavities, live-well, bilge and transom wells, tracks, buckets, and any other water reservoirs.
- When possible, wash and rinse equipment thoroughly with hard spray or HOT water (?140° F, typically available at do-it-yourself car wash sites), and dry in the hot sun before using again.

Streams and Wetlands – Clean Water Act Permits: Streams and wetlands in the project area should be protected from activities that degrade habitat conditions. For example, soil erosion, water pollution, placement of fill, dredging, in-stream activities, and riparian corridor removal, can modify or diminish aquatic habitats. Streams and wetlands may be protected under the Clean Water Act and require a permit for any activities that result in fill or other modifications to the site. Conditions provided within the U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404 permit (http://www.nwk.usace.army.mil/Missions/RegulatoryBranch.aspx) and the Missouri Department of Natural Resources (DNR) issued Clean Water Act Section 401 Water Quality Certification (http://dnr.mo.gov/env/wpp/401/index.html), if required, should help minimize impacts to the aquatic organisms and aquatic habitat within the area. Depending on your project type, additional permits may be required by the Missouri Department of Natural Resources, such as permits for stormwater, wastewater treatment facilities, and confined animal feeding operations. Visit http://dnr.mo.gov/env/wpp/permits/index.html for more information on DNR permits. Visit both the USACE and DNR for more information on Clean Water Act permitting.

For further coordination with the Missouri Department of Conservation and the U.S. Fish and Wildlife Services, please see the contact information below.

MDC Natural Heritage Review
Resource Science Division
P.O. Box 180
Jefferson City, MO
65102-0180
Phone: 573-522-4115 ext. 3182
NaturalHeritageReview@mdc.mo.gov

U.S. Fish and Wildlife Service
Ecological Service
101 Park Deville Drive
Suite A
Columbia, MO
65203-0007
Phone: 573-234-2132

PRELIMINARY REPORT

Miscellaneous Information

FEDERAL Concerns are species/habitats protected under the Federal Endangered Species Act and that have been known near enough to the project site to warrant consideration. For these, project managers must contact the U.S. Fish and Wildlife Service Ecological Services (101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132; Fax 573-234-2181) for consultation.

STATE Concerns are species/habitats known to exist near enough to the project site to warrant concern and that are protected under the Wildlife Code of Missouri (RSMo 3 CSR 1 0). "State Endangered Status" is determined by the Missouri Conservation Commission under constitutional authority, with requirements expressed in the Missouri Wildlife Code, rule 3CSR 1 0-4.111. Species tracked by the Natural Heritage Program have a "State Rank" which is a numeric rank of relative rarity. Species tracked by this program and all native Missouri wildlife are protected under rule 3CSR 10-4.110 General Provisions of the Wildlife Code.

Additional information on Missouri's sensitive species may be found at http://mdc.mo.gov/discover-nature/field-guide/endangered-species . Detailed information about the animals and some plants mentioned may be accessed at http://mdc4.mdc.mo.gov/applications/mofwis/mofwis_search1.aspx . If you would like printed copies of best management practices cited as internet URLs, please contact the Missouri Department of Conservation.

PRELIMINARY REPORT

Missouri Department of Health and Senior Services
P.O. Box 570, Jefferson City, MO 65102-0570 Phone: 573-751-6400 FAX: 573-751-6010
RELAY MISSOURI for Hearing and Speech Impaired: 1-800-735-2466 VOICE: 1-866-735-2460

Randall W. Williams, MD, FACOG
Director

Eric R. Greitens
Governor

Dawson Metal Products Camdenton Facility #2
Camdenton, Mo
Site Investigation
MDHSS, 2017

November 8, 2017

Valerie Wilder, Superfund Section Chief
Hazardous Waste Program
Division of Environmental Quality
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Dear Ms. Wilder:

As requested by the Missouri Department of Natural Resources (MDNR), the Missouri Department of Health and Senior Services (MDHSS) has reviewed and evaluated the October 2017 analytical results of volatile organic compounds (VOCs) from indoor air and subslab soil gas samples collected from the Dawson Metal Products Camdenton Facility #2, Camden County, Missouri. MDHSS evaluated the results for potential human health risks to employees of the facility from vapor intrusion (VI), a process where vapors from VOCs in groundwater or soil migrate indoors where they can accumulate to levels of health concern in indoor air. These samples were collected as part of an investigation into the suspected historical disposal of Trichloroethylene (TCE) out the back loading dock area of the facility for approximately one year in the early 1970s.

Indoor air and subslab soil gas samples of TCE and other VOCs were collected from various locations within the facility. To determine whether detected levels of compounds are of concern to workers of the facility, MDHSS compared these concentrations to health-based comparison levels established to be protective for indoor air exposure by the VI pathway in a commercial setting, specifically comparison was made to the U.S. Environmental Protection Agency (EPA) June 2017 Vapor Intrusion Screening Levels (VISLs) using a target cancer risk of 1E-5 and a target non-cancer hazard quotient of 1.

Indoor air levels of TCE and other VOCs do not exceed these health-based levels; however, the levels of TCE in subslab vapor in one area of the building are elevated (ranging from non-detect to 20,000 $\mu g/m^3$). This area of the building coincides with the area of the building where TCE was reportedly disposed of in the past and also shows the highest TCE levels detected in indoor air (2.1 $\mu g/m^3$). This indicates that vapor intrusion into the building is likely occurring. Although indoor air levels of TCE did not exceed health-based comparison levels during this sampling, only limited data from this one-time sampling event is currently available and indoor air levels may fluctuate over time. The documented source of TCE in subslab vapor indicates a potential for VI to impact indoor air at levels of health concern and presents a potential risk that should be addressed. Given the potential risk, MDHSS recommends preemptive mitigation actions be implemented as soon as possible to ensure the protection of individuals working at the facility.

If you have any questions regarding this recommendation, please contact Michelle Hartman of my staff at (573) 751-6102.

Sincerely,

Jeff Wenzel, Interim Chief
Bureau of Environmental Epidemiology

JW:MH:mp

COMBINED PRELIMINARY ASSESSMENT/SITE INSPECTION REPORT

Dawson Metal Products Camdenton Facility #2
Camdenton, Mo
Site Investigation
MDNR, 1999

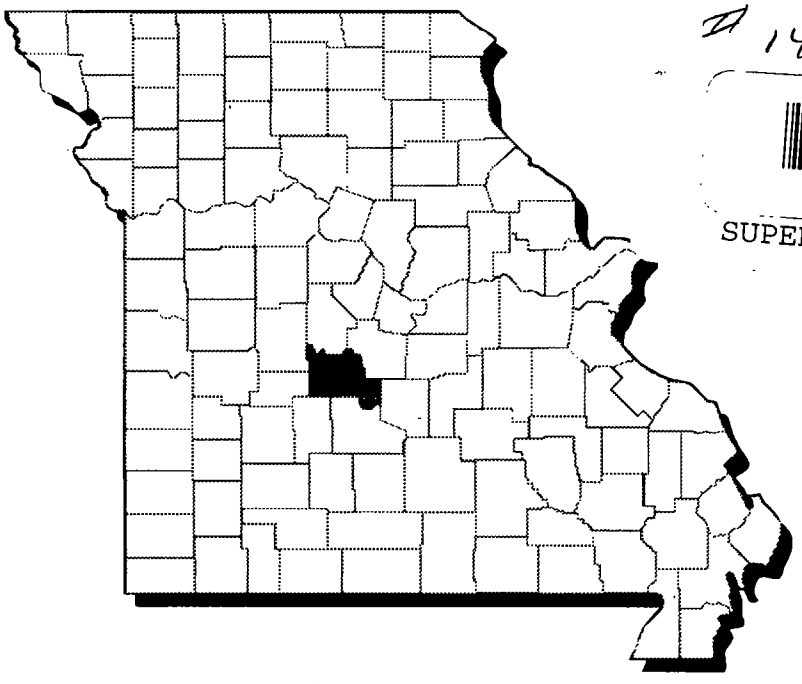
Former Hulett Lagoon Site
Camdenton, Missouri

March 30, 1999

Site: Former Hulett Lagoon
ID #: MOSFN0703530
Break: 1.5
Other:
3-30-99

143106

143106
SUPERFUND RECORDS



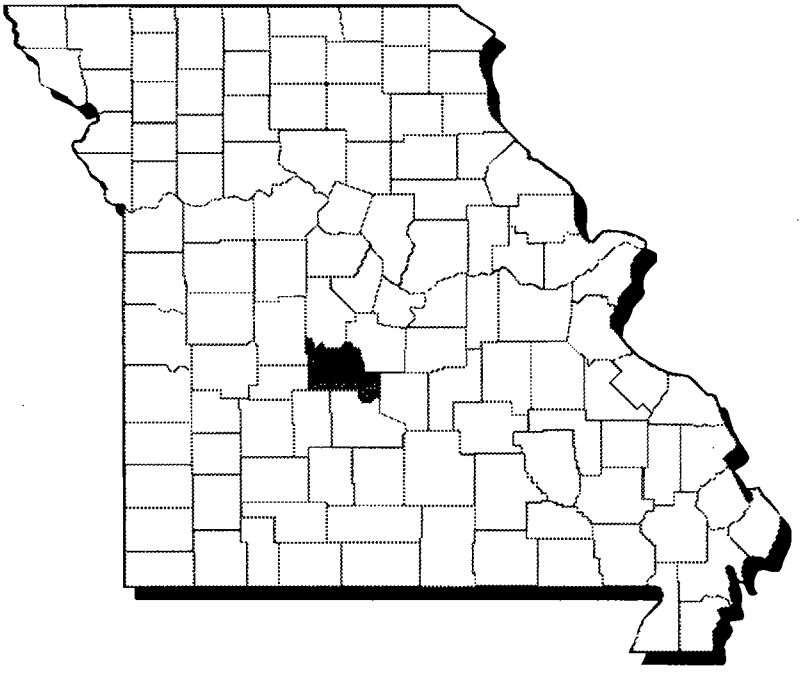
Missouri Department of Natural Resources
Division of Environmental Quality
Hazardous Waste Program

NARRATIVE

COMBINED PRELIMINARY ASSESSMENT/SITE INSPECTION REPORT

Former Hulett Lagoon Site
Camdenton, Missouri

March 30, 1999



Missouri Department of Natural Resources
Division of Environmental Quality
Hazardous Waste Program

TABLE OF CONTENTS

1.0 Introduction 1

2.0 Site Description 1
- 2.1 Location 1
- 2.2 Site Description 2
- 2.3 Operational History 3
  - General Overview of Hulett Lagoon 3
  - Ownership History of Facility at 179 Sunset Drive 3
  - Operational History of 179 Sunset Drive Facility 4
  - Operational History/Regulatory Compliance of Hulett Lagoon 5
  - DNR Inspection - September 7, 1978 5
  - DNR Geologic Investigation - September 12, 1978 6
  - Lagoon Sampling in 1984 6
  - Construction of Sundstrand's Pretreatment Plant in 1986 6
  - Construction Permit for Lagoon to Replace Hulett Lagoon 6
  - Pretreatment Monitoring Report - April 30, 1987 6
  - Hulett Lagoon Closure 7
- 2.4 Site History and Previous Investigations 8
  - Preliminary Assessment/Site Inspection at 179 Sunset Drive Facility 8
  - RCRA Corrective Action at 179 Sunset Drive Facility 8
  - Referral of Former Hulett Lagoon to Superfund Section 8
- 2.5 Waste Characteristics 9
  - Trichloroethene 9

3.0 Waste/Source Sampling 10
- 3.1 Previous Sampling 10
- 3.2 PA/SI Sampling 11
- 3.3 PA/SI Analytical Results 11
- 3.4 Conclusions 12

4.0 Groundwater Pathway 14
- 4.1 Hydrogeologic Setting 14
  - Stratigraphic Units 14
  - Aquifers 14
  - Aquifer Discontinuities 17
  - Wellhead Protection Area 17
  - Karst Features 17
- 4.2 Groundwater Targets 17
  - Public Drinking Water Wells 17
  - Private Drinking Water Wells 20
- 4.3 Previous Sampling 21
  - Monitoring Wells 21
  - Public Drinking Water 21

TABLE OF CONTENTS, Cont'd.

Private Wells 22
4.4 Sampling Locations 23
Monitoring Wells 1 & 2 23
Monitoring Wells 3 & 4 23
Monitoring Well 5 23
Public Wells 24
Private Wells 24
4.5 Analytical Results 24
Monitoring Wells 25
Public and Private Drinking Water Wells 25
4.6 Conclusions 26

5.0 Surface Water Pathway 26
5.1 Hydrologic Setting 26
5.2 Surface Water Targets 28
5.3 Surface Water Conclusions 28

6.0 Soil Exposure and Air Pathways 29
6.1 Physical Conditions 29
6.2 Soil and Air Targets 29
6.3 Soil and Air Conclusions 30

7.0 Summary and Conclusions 30
Waste/Source Sampling 31
Groundwater 31
Surface Water 32
Soil and Air 32

8.0 Recommendations 32

References 34

Tables
Table 1: Selected Analytical Results from Soil Samples Collected by Dames & Moore in Hulett Lagoon on October 11, 1996 10
Table 2: Analytical Results from Soil Samples Collected In/Near the Hulett Lagoon 13
Table 3: Stratigraphic Column for Former Hulett Lagoon, Camden County 18
Table 4: Public Wells Within a 4-Mile Radius of the Former Hulett Lagoon Site ... 20
Table 5: Private Wells Registered with DNR Within a 4-Mile Radius of the Former Hulett Lagoon Site 20
Table 6: TCE Concentrations in Modine Groundwater Monitoring Wells 1-5 21
Table 7: TCE Results from Sampling at City of Camdenton's Public Drinking Water Wells 22

TABLE OF CONTENTS, Cont'd.

Table 8: Selected Groundwater Results from PA/SI Sampling at Modine Monitoring Wells 1-5 25
Table 9: Selected Groundwater Results from PA/SI Sampling at Public and Private Groundwater Wells 25
Table 10: Estimated Population Within a 4-Mile Radius 30

Appendix A, Figures
Figure 1: Site Location Map, Former Hulett Lagoon Site, Camden County, MO
Figure 2: Hulett Lagoon Site, Soil Sampling Locations
Figure 3: Hulett Lagoon Site, Well Sampling Locations

DATE: March 30, 1999

PREPARED BY: Valerie H. Wilder
Missouri Department of Natural Resources

SITE: Former Hulett Lagoon
Camden County

C.A. NUMBER: V997381-98-0

EPA ID. NUMBER: N/A

1.0 INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Missouri Department of Natural Resources (DNR), through a cooperative agreement with the U.S. Environmental Protection Agency (EPA), conducted a combined Preliminary Assessment/Site Inspection (PA/SI) at the Former Hulett Lagoon site in Camden County, Missouri. The purpose of this investigation was to collect sufficient information concerning conditions at the site to assess the threat posed to human health and the environment, to determine the need for additional investigation under CERCLA/SARA or other authority, and if appropriate, support ranking the site using the Hazard Ranking System (HRS) for proposal to the National Priorities List (NPL). The scope of the investigation included review of previous file information, sampling of waste and environmental media to evaluate and document HRS factors, and collecting additional non-sampling information. Investigations included site visits on December 1, 16, 1998 and site sampling on January 6-7, 21,1999. The PA/SI was initiated on October 27, 1998.

2.0 SITE DESCRIPTION

2.1 Location

The Former Hulett Lagoon site is the location of a closed wastewater lagoon. The lagoon is located in the City of Camdenton, 500 feet northeast of the intersection of Dawson Road and Sunset Drive (Reference 3). Geographic coordinates for the site are 38°00'41.1" north latitude and 92°45'17.0" west longitude, as measured using the Garmin 12LX Global Positioning System (Reference 4). The lagoon is in the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4) of Section 24, Township 38 North, Range 17 West in Camden County. Figure 1 is a site location map (Reference (Reference 3).

The site can be accessed from the intersection of U.S. Highway 54 and State Route 5 in Camdenton by taking State Route 5 northwest for 0.3 of a mile to East Mulberry; take a left onto East Mulberry and the first right onto West Mulberry. When the paved portion of West Mulberry curves to the left, continue straight onto a gravel driveway that leads behind the Ron Hulett Chev-Olds-Buick Jeep/Eagle Automobile Dealership. Stay to the left on a gravel road that leads down to the lagoon. This road is not regularly maintained; there are several severe ruts caused from washouts (Reference 5).

The Camdenton area receives an average of 42.32 inches of precipitation annually, and an average of 19 inches of snowfall annually (Reference 6, p. 2). The 2-year 24-hour rainfall estimated at 3.5 inches (Reference 7). The average daily temperature during the summer months is 77° F, and the average winter temperature is 35° F (Reference 6, p. 2). The average wind speed and direction is approximately 10 miles per hour from the south (Reference 8, p. 74).

2.2 Site Description

The former Hulett lagoon is a closed wastewater sewage lagoon operated by the City of Camdenton from 1961 to 1988. The lagoon was approximately one acre in size (Reference 9, p. 12). Photos 1 and 2 were taken in October 1974 when the lagoon was operating. Photo 1 shows the north side of the lagoon where an influent pipe from a city sewer line entered the lagoon. Photo 2 shows the south side of the lagoon where an influent pipe from an industrial facility entered the lagoon. The wooden catwalk, also shown in photo 2, extended into the lagoon and supported the outlet pipe, which ran under the catwalk, and could be raised and lowered with a crank handle (the red apparatus on the end of the catwalk railing). More detailed operating conditions are discussed in the next section. A dirt road ran along the berm and surrounded the lagoon, as shown in photos 1 and 2.

In 1989, the lagoon was closed; the water was drained and the sludge was removed (Reference 9, p. 12). Photo 3 was taken during the dewatering process. The site is currently an open field area with grassy vegetation (Photos 4, 6-8). Remnants of the former berm and the road that surrounded the lagoon are still visible. The lagoon area is generally flat with surface runoff flowing to the northwest and entering an intermittent drainage that travels to the west. There is a monitoring well (MW), installed in July 1998, located just outside what would have been the southwest edge of the berm of the lagoon. This is known as MW-5 (Reference 5).

The lagoon is located in a mixed residential/commercial area of Camdenton. It is bordered on the north by an apartment complex (Photo 8); on the west by a strip of woods about 500 feet wide with Dawson Road on the other side; on the east by woods (Photo 7); and on the south by a strip of woods (Photo 6) and then residents. Access to the lagoon area is not restricted. There is no fencing or gates. The Ron Hulett car dealership personnel have

reported unauthorized dumping in the wooded area behind their facility that borders the road leading down to the lagoon (Reference 5).

2.3 Operational History

General Overview of Hulett Lagoon

The City of Camdenton, Missouri has owned the former Hulett lagoon property since at least 1961 and retains ownership today. The lagoon was constructed in 1961 under the State of Missouri Grants Program. The lagoon was constructed of clay, and its berms were approximately 25 feet wide and 15 feet high (Reference 9, p. 12). The lagoon was named and most commonly referred to as the Hulett Lagoon due to its proximity to the Ron Hulett automobile dealership that is located at 249 N. Highway 5 (Reference 5). The lagoon was also referred to as the Factory Lagoon and Camdenton Lagoon #3 (Reference 10).

The Hulett lagoon was in operation from 1961 until its closure in late 1989. It was one of five municipal lagoons that serviced the City of Camdenton, however, it was the only lagoon that received industrial effluent in addition to domestic sewage. From 1967 through 1986 a nearby manufacturing facility released untreated wastewater and storm water into the lagoon through a series of "mudpits", or sumps, via a storm sewer. In 1986, the facility installed a pretreatment wastewater system that replaced the mudpits and lagoon system (References 9, p. 12; 11, p. 1).

The facility is located approximately 1,000 feet southeast of the lagoon at 179 Sunset Drive. Heat transfer components for commercial and automotive industries are manufactured at the facility. The untreated wastewater was known to have contained several hazardous waste streams including corrosive waste, wastewater treatment sludges from electroplating operations, and waste oil. In addition, residual contaminants associated with degreasing operations, including TCE, was discharged into the mud pits and ultimately into the Hulett lagoon (References 9, p. 12; 11, p. 1; 16, p. 8).

Ownership History of Facility at 179 Sunset Drive

The 179 Sunset Drive property was originally held by Dawson Metal Products, Inc., a Kansas Corporation ("Dawson-Kansas"), pursuant to a lease dated November 28, 1966 between Dawson-Kansas and the Camdenton Industrial Development Corporation. The lease had a term of ten years, which is believed to have commenced July 1, 1967, with an option for Dawson-Kansas to purchase (Reference 12, p. 3).

On June 12, 1972, Dawson Metal Products, Inc. was issued a Certificate of Incorporation in the State of Delaware (Reference 13). In 1972 Sundstrand Corporation incorporated Dawson Metal Products, Inc., a Delaware Corporation ("Dawson-Delaware"), as a wholly owned subsidiary of Sundstrand Corporation. On June 29, 1972, Dawson-Delaware acquired the business and assets of Dawson-Kansas. In connection with the acquisition Dawson-Delaware, by way of assignment, acquired a leasehold interest in the 179 Sunset Drive property (Reference 12, p. 3). On September 25, 1972, Dawson Metal Products, Inc.

(the Delaware Corporation) was authorized as a Foreign Corporation in the State of Missouri to carry on the business of sale and distribution of air conditioning equipment and related parts (Reference 14).

On May 25, 1977 Dawson Metal Products, Inc. (the Delaware Corporation) changed its corporate name in the State of Missouri to Sundstrand Tubular Products, Inc. (Reference 15).

On August 24, 1990, Sundstrand agreed to sell the business and assets of Sundstrand Tubular Products, Inc. to Modine Heat Transfer, Inc., a wholly owned subsidiary of Modine Manufacturing Company, a Wisconsin based corporation that operates and conducts business in the state of Missouri. This transaction was closed on October 18, 1990 (References 16, pp. 3, 4; 12, p. 3).

On November 27, 1990, Sundstrand Tubular Products, Inc. changed its name to Sundstrand Camdenton, Inc (Reference 12, p. 3). On April 18, 1991, Sundstrand Tubular Products, Inc., a Foreign Corporation, was formally withdrawn from the State of Missouri (Reference 17). On March 15, 1994 Sundstrand Camdenton, Inc. was liquidated (Reference 12, p. 3).

On April 1, 1997, Modine Heat Transfer, Inc. merged with Modine Manufacturing Company; thus, changing its name to Modine Manufacturing Company. Modine is the current owner/operator of the facility (Reference 16, pp. 3, 4).

Operational History of 179 Sunset Drive Facility

The facility at 179 Sunset Drive has always been used to manufacture air-conditioning coils and feeder parts from aluminum and copper tubing. According to Sundstrand personnel, the manufacturing process flowed as follows:

- copper and aluminum tubing were fed from rolls to benders to form U shapes and then cut off;
- parts were then immersed in alkaline cleaning lines to remove oil and chips;
- parts were degreased to remove any remaining oil;
- clean parts were assembled and small U shaped copper tubing and aluminum tubing ends were brazed to assembled cores using manual and automatic brazing systems;
- the assembled heat transfer components were degreased and/or alkaline cleaned and then tightness tested using refrigerant; and
- finally, the components were then painted if required by the customer and packaged for shipment (Reference 12, p. 4)

The manufacturing process consisted of aluminum etching, and a small amount of chromium electroplating (Reference 11, p. 2). According to an Environmental Site

Assessment conducted in November 1991 for Modine Manufacturing Company, the facility generated TCE waste during degreasing operations from the early 1970's to December 1990. In December 1990, they began using 1,1,1-trichloroethane (TCA) for degreasing operations (Reference 18, p. 1).

Four mudpits (sumps) were utilized by the facility from 1967 to 1986. The mudpits were connected by a six-inch steel line that delivered storm water (from 1979 to 1983, eliminated in 1983), boiler water and cleaning line waste to the Hulett lagoon. The mudpits were located adjacent to the manufacturing building on the west side. Each mudpit consisted of a 4' x 4' x 4' cement sump. Each sump received the previous sumps' wastes until discharged into the sewer. The southern most mudpit, #4, was an open pit that collected boiler water and storm water. Mudpit #3 collected aluminum cleaning line waste and storm water from mudpit #4. Mudpit #1 collected copper cleaning line waste in addition to aluminum cleaning line waste and storm water from the first two mudpits. Hulett lagoon potentially received hazardous waste from the facility's four mudpits and associated piping, identified by the following hazardous waste codes: F006 (wastewater treatment sludges from electroplating), D002 (corrosive waste) and D098 (waste oil). In addition, residual contaminants associated with degreasing operations, including TCE, did go through collection lines into the mud pits and ultimately into the Hulett lagoon (References 9, p. 13; 16, p. 8).

Operational History/Regulatory Compliance of Hulett Lagoon

The Hulett Lagoon operated with a National Pollutant Discharge Elimination System (NPDES) Permit (MO-0048577) issued under the Clean Water Act by the DNR's Water Pollution Control Program (WPCP) (Reference 10). The WPCP database shows the permit issued July 1985, although it is likely the permit was actually issued earlier. The permit was terminated February 29, 1988.

DNR Inspection - September 7, 1978

In September 1978, DNR personnel conducted an inspection of the operation and condition of the wastewater treatment facilities serving the City of Camdenton. The inspector noted that the Hulett Lagoon had a large problem with its industrial influent. The sewage from Sundstrand was entering the lagoon at the south end, which was the same end that the lagoon's discharge pipe was located. The retention time for the industrial waste was far too short a period to treat the waste. To correct the problem, it was recommended that the location of the influent pipe from Sundstrand be moved to the north end of the lagoon, or the sewage line be tied in to the other influent line already at the north end. The inspector also noted that the strength of the Sundstrand industrial sewage entering the Hulett Lagoon was apparently too great for the facility to handle. It was recommended to the city that they enforce their sewer use ordinance to prevent misuse of the sewers and sewage treatment facilities (Reference 19).

DNR Geologic Investigation - September 12, 1978

On September 12, 1978 DNR personnel from the Division of Geology and Land Survey (DGLS) conducted an investigation for an Engineering Geologic Report on the Collapse Potential of Camdenton Lagoons. The inspector noted that the problems at the Hulett lagoon appeared to be design related and not geologic. Like the previous inspectors, DGLS personnel noted the short circuiting problem. They observed effluent from the metal fabricating plant bubbling up approximately 40 feet from the discharge pipe. There was an area of thick floating effluent. An open channel existed directly from the inlet pipe to the discharge pipe. Discharge from the lagoon was dark green in color with thick white foam floating on the surface (similar to that in Photo 2) (Reference 20).

Lagoon Sampling in 1984

On May 22, 1984 the City of Camdenton collected samples of the Hulett lagoon water, Sundstrand's influent to the lagoon, housing influent to the lagoon, effluent from the lagoon, and water near Lake of the Ozarks. Results showed 41 parts per billion (ppb) TCE in the Sundstrand influent and 28 ppb TCE in the effluent from the lagoon (Reference 21).

On July 19, 1984 additional samples of Sundstrand's effluent and lagoon water were collected. This Sundstrand effluent sample showed 4,900 ppb TCE in addition to 7,600 ppb, total chromium, 29,000 ppb total copper, and 1,400 ppb total zinc. The sample from the lagoon showed 500 ppb TCE, 500 pbb total chromium, 200 ppb hexavalent chromium, 4100 ppb total copper and 230 ppb total zinc (Reference 22).

Construction of Sundstrand's Pretreament Plant in 1986

Sundstrand and the City of Camdenton joined efforts in 1986 to obtain a Community Development Betterment Grant (CDBG) from the state to construct a pretreatment plant at the Sundstrand facility. The plant was completed and on line as of April 14, 1986. The plant still operates today (Reference 23).

Construction Permit for Lagoon to Replace Hulett Lagoon

On September 23, 1986, DNR issued the City of Camdenton a Construction Permit for sewers, force mains and lift stations for transport of waste to the C.P. White Lagoon. The construction permit stated that these facilities were designed to allow for elimination of the existing factory lagoon (Hulett Lagoon) (Reference 24).

Pretreatment Monitoring Report - April 30, 1987

At the request of DNR's WPCP, a pretreatment monitoring survey was conducted of the industrial wastewater discharge of the Sundstrand Tubular Products factory. On April 30, 1987, DNR's Environmental Services Program (ESP) collected a grab sample of the effluent from the treatment system discharge weir. The sample was analyzed for cyanide, total metals (silver, cadmium, chromium, copper, hexavalent chromium, nickel, lead, zinc). The sample was also supposed to be analyzed for volatile organic compounds (VOCs), however, there were no results for VOCs due to analytical error. Results showed

chromium at 2,700 ppb, copper at 890 ppb, hexavalent chromium at 180 ppb, nickel at 50 ppb, and zinc at 110 ppb (Reference 25).

Hulett Lagoon Closure

In 1988, the City of Camdenton began closure of the Hulett Lagoon pursuant to an Industrial Development Grant overseen by DNR's WPCP. As per DNR guidelines for closing out municipal lagoons, sampling and analysis of the sludge in the lagoon was limited to metals and other parameters such as total solids. High levels of chromium, lead, and nickel were detected (Reference 26). DNR offered the City officials several options to consider in completing the closure of the lagoon (Reference 27). The option chosen and implemented by the city was subsurface application of the sludge from the lagoon to a sludge disposal site owned by the city. DNR approved the sludge disposal plan on February 22, 1989 (Reference 28).

The city's engineering consultant, Missouri Engineering Corporation, supervised the lagoon closure project. In June 1989, McCormick Gravel & Excavating of Versailles, Missouri was awarded the contract for the removal, stockpiling and disposal of sludge from the lagoon. The contract included lagoon dewatering, preparation, transportation, and stockpiling of the sludge, as well as disposal by land application at chosen site at the Camdenton Memorial Airport (CMA), four miles southeast of Camdenton (References 29; 30).

The specifications called for the contractor to pump the water from the lagoon and discharge it into the existing sewer manhole approximately 100 feet away (Reference 29). The process of removing the sludge at the lagoon began on July 11, 1989 and was completed sometime in late September 1989. Lime was added to the sludge at the lagoon to raise the pH and immobilize the metals. The project contract was originally written with an estimate of 1,500 cubic yards of sludge to be removed. However, due in part to an unusually high amount of rain during the removal process, the sludge did not dry out and shrink, as it should have. In addition, each time it would rain, the rain would cause the sludge to be spread across the lagoon contaminating more soil. The lagoon had to be pumped again and the sludge allowed to dry. A small amount of soil then had to be removed along with the sludge. When that portion of the project was completed, an estimated 2,395 cubic yards of sludge had been removed (References 31; 32; 33). The berms of the lagoon were turned in and mixed with a 1 to 1 ratio (Reference 34). No soil was brought in for the mixing. Some soil from the hillside southeast of the lagoon was scraped in to fill the void (Reference 5).

The sludge was deposited at the CMA from July through December 1989. The area at the CMA where the sludge was disposed of is being investigated as a separate site - the Camdenton Sludge Disposal Area. A Combined Preliminary Assessment/Site Inspection is being conducted at the site, and will be completed by April 1999.

2.4 Site History and Previous Investigations

Preliminary Assessment/Site Inspection at 179 Sunset Drive Facility
In 1992, DNR conducted a PA and an SI of the facility at 179 Sunset Drive under the name Sundstrand site (MOD062439351). The investigations were initiated due to a complaint filed with DNR alleging that 4,500 gallons of TCE had been spilled at the facility. Neither the PA nor the SI included any off-site investigations of the former lagoon or sludge disposal area (References 35; 36).

In addition to the PA and SI conducted by DNR, there were several other investigations conducted at the Modine facility during that time period by EPA contractors and Modine consultants. In general, all of the investigations documented and/or confirmed the presence of chlorinated solvents, including TCE, in the soils and groundwater at the facility. At that time, the DNR determined that oversight authority of the facility was most appropriate under the Resource Conservation and Recovery Act (RCRA).

RCRA Corrective Action at 179 Sunset Drive Facility
Modine Manufacturing Company is currently negotiating a Corrective Action Abatement Order on Consent (AOC) through the Permits Section of DNR's Hazardous Waste Program (HWP). The objectives of the AOC include investigation to determine the nature and extent of any release of hazardous waste at the facility and to remediate any releases in order to protect human health and the environment (Reference 16). There have already been several investigations and a certain amount of remedial activities conducted by Modine at the facility and in the surrounding area. Detailed information regarding a subsurface investigation conducted at the Hulett lagoon in 1996 is included in Section 3.1 Previous Waste/Source Sampling. More information regarding groundwater sampling conducted in the area is included in Section 4.2 Previous Groundwater Sampling.

Referral of Former Hulett Lagoon to Superfund Section
On September 8, 1998 the Permits Section of the HWP formally referred investigation of the former Hulett Lagoon to the Superfund Section of the HWP. Investigation of the Hulett Lagoon is not included in the AOC with Modine due to the fact that, in addition to receiving wastewater from the facility at 179 Sunset Drive, the lagoon also received domestic sewage from the surrounding residences. A dye trace study of the City of Camdenton's sewer system performed by DNR's DGLS on August 5, 1998, verified that facility wastewater mixes with domestic sewage prior to entering city property (Reference 37).

According to 40 CFR 261.4(a)(1), domestic sewage and any mixture of domestic sewage and other wastes that pass through a sewer system to a publicly owned treatment works (POTW) are not considered solid wastes, and thus would not be considered hazardous wastes. The facility that disposes of such wastes is excluded from RCRA permitting requirements, which is why the Hulett Lagoon site was referred to Superfund to be addressed under CERCLA. CERCLA has no such exemption.

2.5 Waste Characteristics

The primary contaminant of concern at the Former Hulett Lagoon site is the volatile organic compound (VOC) trichloroethene (TCE). Analytical results from soil and groundwater sampling show TCE at concentrations above Superfund Chemical Data Matrix (SCDM) health-based benchmarks as well as the Maximum Contaminant Level (MCL) for drinking water (Reference 38).

Trichloroethene

TCE is a nonflammable, colorless liquid at room temperature with a somewhat sweet odor and sweet, burning taste. The manmade chemical does not occur naturally in the environment. TCE is now mainly used as a solvent to remove grease from metal parts. It is also used as a solvent in other ways and is used to make other chemicals. TCE evaporates easily into the air but can persist in the soil and groundwater. Once TCE is in surface water, much of it will evaporate into the air. It will take days to weeks to break down in surface water; in groundwater, the breakdown is much slower because of the slower evaporation rate. Very little TCE breaks down in the soil, and it can pass through the soil into underground water (Reference 39, pp. 1, 2).

TCE can enter the body from breathing air or drinking water containing TCE. It can also enter through the skin, but not as easily as by breathing or drinking. If the chemical is inhaled, about half will enter the bloodstream and organs; the remaining is exhaled. If TCE is swallowed, most will be absorbed into the blood. The liver changes most of the TCE to other chemicals and the majority of these breakdown products leave the body in the urine within a day. Some of the common symptoms to TCE exposure (usually at high levels) are headaches, dizziness, and rashes. Laboratory animals that were exposed to moderate levels of TCE had enlarged livers, and high-level exposure caused liver and kidney damage. However, it is not known if these changes would occur in humans. TCE is considered an animal carcinogen (Reference 39, pp. 1-4).

TCE is known as a Dense Nonaqueous Phase Liquid (DNAPL). DNAPLs are separate-phase hydrocarbon liquids that are denser than water. DNAPLs can exist in the soil/aquifer matrix in free-phase form or in residual form. When released on the ground's surface, free-phase DNAPLs move downward through the soil matrix under the force of gravity or laterally along the surface of sloping fine-grained stratigraphic units. As free-phase DNAPLs move, residual amounts are trapped in pores and/or fractures by capillary forces. Trapped DNAPLs are known as residual saturation. This residual saturation is a function of the physical property of the DNAPL and the hydrogeologic characteristics of the soil/aquifer medium, which typically ranges from 5-50% of total pore volume (Reference 40).

Most DNAPLs undergo only limited degradation in the subsurface and persist for long periods of time, while slowly releasing soluble organic constituents to groundwater through

dissolution. Dissolution may continue for hundreds of years under natural conditions before the DNAPL is dissipated (Reference 40).

3.0 WASTE/SOURCE SAMPLING

3.1 Previous Sampling (Reference 41)

On October 11, 1996, on behalf of Modine Manufacturing Company, Dames & Moore conducted a subsurface investigation at the former Hulett lagoon. The purpose of the investigation was to determine the presence or absence of VOCs, in particular TCE, in soil at the former Hulett lagoon.

Four hydraulically driven probes were advanced in the area of the lagoon where the inlet pipe from the former Sundstrand facility and the outlet or discharge pipe from the lagoon were previously located. The soil within the probe cores was continuously sampled and field screened using a photoionization detector (PID). The soil sample exhibiting the highest indication of VOC content from each probe core was submitted for analysis. The samples were analyzed for VOCs only. The following table presents results for those samples.

TABLE 1: SELECTED ANALYTICAL RESULTS FROM SOIL SAMPLES COLLECTED BY DAMES & MOORE IN HULETT LAGOON ON OCTOBER 11, 1996

Sample ID	Depth	Analyte Detected	Concentration (in ppm)
GP-1	4' - 6'	chloroform	0.20
		TCE	9.17
GP-2	4' - 5.5'	TCE	1.94
GP-3	4' - 5'	chloroform	0.0094
		cis-1,2-dichloroethene	0.0914
		TCE	not detected
GP-4	4' - 6'	TCE	not detected

Although the majority of sludge from the lagoon was supposedly removed during closure, these sampling results indicated that TCE contamination was still present in the lagoon area. Dames & Moore and Modine have concluded that the TCE concentrations encountered in the soil at the lagoon supports their previous position that the former lagoon is the off-site source of the observed TCE impact to groundwater at the Modine facility. DNR RCRA Permits personnel hold the position that the nature, extent and source of the TCE groundwater contamination in the area has not been fully determined yet. That is one of the objectives of the AOC currently being negotiated. At least four waste management units on the 179 Sunset Drive property have been identified as potential contributors to TCE soil and groundwater contamination (Reference 16).

3.2 PA/SI Sampling (Reference 38)

PA/SI soil sampling in the lagoon area was conducted on January 21, 1999. Figure 2 is a site map that shows collection location of all soil samples in the lagoon area. A membrane interface probe (MIP), equipped with a PID and a flame ionization detector (FID), was employed to generate soil gas data of the subsurface within and surrounding the boundaries of the former lagoon area.

Ten soil borings (Hulett-01 through Hulett-10) were drilled utilizing a track-mounted hydraulic soil probe. Eight soil grab samples were collected from the lagoon area and one background sample was collected from outside the lagoon. Based upon this sampling, the lagoon is estimated to have been approximately six feet deep. Previous sampling documented refusal, meaning bedrock was encountered, in drilling from a range of five to six feet below ground surface, depending on the boring location. The PA/SI background boring was drilled approximately 25 feet south of the lagoon's edge. The background sample was collected from a 10.5' to 11' depth, which was a similar depth zone as the majority of the source samples from the lagoon, correcting for the rise in elevation at the background sampling point.

3.3 PA/SI Analytical Results (Reference 38)

Reference 38, Appendix B contains the MIP data logs generated for each boring. The logs indicate detections noted on the MIP's PID (identified as "Detector 1") and the FID ("Detector 2"). There were not any significant detections with the MIP for any of the borings.

Table 2, on page 13, presents the analytical results for all soil samples collected by DNR as part of the PA/SI. All soil samples were analyzed for total metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, and silver) and VOCs. If any sample's total analyte levels exceeded 80% of 20 times the Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit for a particular analyte, TCLP analysis was performed on that sample.

The last column in Table 2 lists the Missouri Cleanup Action Level (CALM) C_{LEACH} level for each chemical. These values were listed for additional comparison. The Superfund Chemical Data Matrix (SCDM) benchmarks and MO Any-Use Soil Levels (ASLs) for chemicals only take into account human health effects related to exposure to the chemicals in the soil. They do not take into account the effect the chemicals have when they leach into the groundwater. The C_{LEACH} value was calculated to approximate the physical processes involved in a soil contaminant leaching to the groundwater. The C_{LEACH} value may be interpreted as a soil contaminant concentration, which (within the limitations of the formulas and assumptions used for calculation) if allowed to remain, would leach to the saturated zone and result in a groundwater concentration at or below the MCLs.

Three soil samples contained TCE at a detectable level. TCE was not detected in the background soil sample. The concentrations of TCE detected in the three samples from the lagoon exceed the C_{LEACH} value for TCE, which would indicate the potential exists for TCE to leach into the saturated zone and result in groundwater contamination above the MCL. This is, in fact, the situation at this site, as documented from groundwater samples collected from the monitoring well on-site (discussed in Section 4.5) (Reference 42).

The only sample that contained any metals significantly above background was 991471 from soil boring 4. Barium and cadmium were over three times the background levels, however neither metal was present above the SCDM benchmarks or MO ASLs.

3.4 Conclusions

Although over 2,000 cubic yards of sludge were removed from the lagoon during closure in 1989, PA/SI sampling, as well as previous sampling, document that TCE contaminated soil still remains in the lagoon area. Three samples, collected for the PA/SI near the previous location of the outfall pipe, contained TCE at 9.5 ppm, 0.24 ppm and 0.12 ppm. These TCE concentrations are below health-based benchmarks protective of human exposure to the soil. However, the concentrations exceed the Missouri CALM C_{LEACH} value, which was calculated as a value at which TCE would leach to the saturated zone and result in a groundwater concentration at or below the MCLs. The C_{LEACH} value for TCE was calculated using specific formulas and assumptions that may not necessarily model site conditions at the Hulett lagoon.

One way of testing whether the TCE present in the soil at the lagoon has the potential to leach into groundwater at a level above the MCL would be to perform the Synthetic Precipitation Leaching Procedure on the soil samples. This may be necessary in future investigations.

TABLE 2: ANALYTICAL RESULTS FROM SOIL SAMPLES COLLECTED IN/NEAR THE HULETT LAGOON

All results in parts per million (ppm) * soil saturation level substituted for ASL NA - not analyzed NL - not listed
Underlined results are those that are three times above background or above the detection limit if the background concentration is below the detection limit

	Hulett-01 4.5' - 5'	Hulett-02 6.5' - 7'	Hulett-03		Hulett-04 7.5' - 8'	Hulett-07 5.5' - 6'	Hulett-09 6' - 7'		Hulett-10 10.5' - 11'	SCDM Bnchmrk	MO ASL	MO CALM C_{LEACH}
	991469	991470	3' - 4' 991467	4.5' - 5.5' 991468	991471	991472	991473	991474 (replicate)	991475 (backgrnd)			
METALS												
Arsenic, total	16.1	3.58	13.6	12.5	19.7	17.2	9.68	4.6	10.7	0.0043	11	NL
Barium, total	150	62.4	244	519	750	257	103	132	203	5500	3900	1650
Barium, TCLP	NA	NA	NA	0.442	0.628	NA	NA	NA	NA			
Cadmium, total	0.453	0.254	0.304	0.386	4.52	0.304	<0.2	0.204	0.651	39	28	11
Chromium, total	74.9	31.9	55.5	61.3	68.9	73.3	58.2	39.8	62.7	390	5600	38
Copper, total	39.9	15.7	33.6	37.5	64.3	38.8	6.47	8.56	36.8	NL	NL	NL
Lead, total	116	38.1	118	951	325	80.1	39.1	61.8	94.2	NL	240	NL
Lead, TCLP	<0.025	NA	0.0772	0.143	<0.025	<0.025	NA	NA	<0.025			NL
Mercury, total	0.102	<0.04	0.107	0.139	0.195	0.141	<0.04	<0.04	0.0947	23	17	3.23
Nickel, total	43.3	12.5	49.4	69.6	90.1	36.2	9.76	12.4	32.5	1600	1100	170
Selenium, total	<1	<1	<1	<1	<1	<1	<1	<1	<1	390	280	4.37
Silver, total	<1	<1	<1	<1	<1	<1	<1	<1	<1	390	280	255
VOCs												
Cis-1,2-dichloroethene	0.19	0.14	<0.025	<0.025	<0.025	0.11	<0.025	<0.025	<0.025	780	490*	0.51
Trichloroethene	9.5	0.24	<0.025	<0.025	<0.025	0.12	<0.025	<0.025	<0.025	58	340	0.097

4.0 GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting (Reference 43)

Stratigraphic Units

A stratigraphic column (Table 3 on page 18) has been tabulated based upon the stratigraphy of nearby wells. The youngest bedrock formations beneath the site are expected to be Ordovician-age sediments assigned to the Canadian Series. The Roubidoux Formation consists of dolomite, sandy dolomite, and sandstone. In the Camdenton area, soluble portions of the Roubidoux have generally been removed by dissolution. Nearby well logs indicate that the Roubidoux Formation may have been completely removed by erosion in the vicinity of the site.

Underlying the Roubidoux Formation, the Gasconade Dolomite consists of cherty dolomite and is estimated to be approximately 300 feet thick in the vicinity of the site. A basal unit of the Gasconade Dolomite, known as the Gunter Sandstone Member, commonly separates the Ordovician and Cambrian-age strata. The Gunter Sandstone is approximately 25 feet thick in the Camdenton area.

Cambrian rocks in the Camdenton area were deposited in a complex depositional environment. Camdenton is located near the western margin of a Cambrian-age intrashelf sedimentary basin known as the Central Missouri Basin. To the west lies the north-south trending Lebanon Arch, which consists of carbonate platform rocks, that in some areas, thin over Precambrian highlands. Dramatically different lithologies and abrupt facies changes are depicted in area well logs. In general, more shaly, basinal rocks to the east pinch-out against the Lebanon Arch.

Because of the tectonic setting, Cambrian beds in the Camdenton area are difficult to categorize, and "layer-cake" stratigraphy should not be assumed. The following descriptions are simplified. The upper-most Cambrian unit in the area is the Eminence Dolomite, which consists of approximately 300 – 635 feet of dolomite with minor amounts of chert. The Eminence Dolomite is underlain by about 25 - 230 feet of Potosi Dolomite, which consists of dolomite, chert, and drusy quartz. Beneath the Potosi Dolomite, in descending order, are the Derby-Doerun Dolomite, the shaly Davis Formation, the Bonneterre Formation, and the Lamotte Sandstone. The entire Cambrian section is estimated to be over 1,150 feet thick.

Aquifers

The Ozark Aquifer, which includes all bedrock units above the Cambrian-age Derby-Doerun Dolomite, is the shallowest aquifer beneath site. The Ozark Aquifer is considered exposed at the surface at the Former Hulett Lagoon site. The total thickness of the aquifer is approximately 950 feet. Each of the units which comprise the Ozark Aquifer have individual characteristics that control their water-bearing capabilities; however, in general, the Ozark Aquifer produces good-quality water, with production rates generally proportional

to well depth. Extensive pumping of groundwater in the Camdenton area has created a downward vertical gradient, and the site is located in a groundwater recharge zone.

Because detailed hydrogeologic studies have not been conducted at the site, groundwater flow directions within the bedrock can only be approximated. Prior to pumping of the aquifer, groundwater beneath the site probably flowed westward or northward to discharge areas in the Niangua River valley. Pumping rates at the Camdenton municipal wells are high enough to engulf the site within the cones of depression that surround the municipal wells. The radius of influence of nearby production wells should be determined.

Groundwater flow in the saturated zone is controlled by gradient. According to DGLS geologists, assertions made by Modine's consultants that preferential pathways in the Ozark Aquifer substantially influence flow direction in the saturated zone are incorrect. Water flows downhill; fractures or solution-enlarged channels cannot make water flow uphill. Monitoring well nests are needed to accurately determine the magnitude of the downward vertical gradient. The upper Gasconade Dolomite *may* inhibit the downward migration of contamination. However, fracturing and karst development may have resulted in a local increase in permeability within the otherwise relatively tight upper Gasconade Dolomite.

The Gunter Sandstone is generally highly porous and permeable and is an important source of domestic groundwater supplies in the area. Because the Gunter Sandstone generally yields adequate domestic water supplies, few private wells in the area penetrate the underlying Cambrian Formations. However, municipal wells in the Lake of the Ozarks area are generally cased through the Gunter Sandstone, in order to avoid possible bacterial contamination.

The Eminence and Potosi Dolomites are a major source of municipal drinking water throughout the Ozark area, including the City of Camdenton. The Eminence Dolomite is differentiated from the underlying Potosi Dolomite by the lack of druse. A druse is a rock cavity encrusted with finely crystalline quartz. The druse-rich Potosi Dolomite is the most permeable geologic unit within the Ozark Aquifer and generally has an extensive network of karstic channels.

The shallowest reliable aquitard beneath the site is the St. Francois Confining Unit, approximately 1,200 feet below the surface. The St. Francois Confining Unit separates the Ozark Aquifer from the deeper St. Francois Aquifer. The St. Francois Aquifer includes the Cambrian-age Bonneterre Formation and Lamotte Sandstone. The St. Francois Aquifer is not used as a water source in Camden County. Water losses in the Lamotte Sandstone are common in some parts of the Ozark Region, although the phenomenon is poorly understood. Outside the Cambrian outcrop area, few water wells penetrate the Lamotte Sandstone, since yields may actually be reduced. Groundwater flow directions in the deeper St. Francois Aquifer are generally unknown and may be complicated.

Baseline water-level and pumping rate data needs to be collected before informed decisions about groundwater movement in the Camdenton subsurface can be made. Static water levels should be measured at least monthly at any inactive wells. Detailed records of active wells should include volume of water pumped, length of pumping cycles, and drawdown measurements. The Mulberry City Well (which was shut down on January 26, 1999 because of TCE contamination) produced approximately three times the volume of the other two city wells, suggesting the aquifer is highly heterogeneous. The Mulberry Well probably intercepted more solution-enlarged cavities than the other city wells, although lithologic differences can also explain differences in well yield. Wide variations in aquifer parameters are common in carbonate areas.

The three Camdenton city wells produced a total of 232,458,000 gallons in 1997. An estimate of the cone of depression produced by this pumping can be made by comparing Camdenton to the city of Rolla, which is located in a similar ridge-top geologic setting approximately 50 miles east of Camdenton. In 1960, four Rolla city wells produced approximately 290,250,000 gallons of water from the Ozark Aquifer. The resulting cone of depression was over five miles wide. By 1960, pumping of the Ozark Aquifer in the Rolla area had dropped water levels up to 150 feet compared to the predevelopment potentiometric surface. The relatively deep depth to groundwater in the Camdenton area suggests a similar radius of effect can be expected. Any potential site-related contaminants reaching the water table are expected to move toward the nearest Camdenton City well. Until recently, hydraulic control beneath the Former Hulett Lagoon and Modine sites has been maintained by pumping at the Mulberry well. Now that the Mulberry well has been shut off, TCE contamination is expected to move toward another city well.

Monitoring wells at the Modine site are open to different depth intervals. Therefore, data from these wells cannot be used to create a potentiometric map. The fact that two of the four wells have gone dry in the past suggests that the vertical flow component is significant. Water levels in area wells tend to decrease with depth, supporting the statement that the vertical flow is downward. As previously mentioned, a downward gradient is to be expected in an active municipal well field, particularly if it is located on a ridge top. Static water levels measured during the construction of the newest Camdenton City well (Hickory Street or well # 7) also verify the downward gradient. The Hickory Street well is 1,100 feet deep with 462 feet of casing. The static water level before pressure-grout sealing of the well casing was 222 feet below ground surface. Static water level after sealing was 260 feet below ground surface, indicating a downward vertical gradient. A large upland area that might provide recharge to the Camdenton City wells does not exist. Groundwater monitored by the monitoring wells is essentially moving downward to recharge the pumping wells. Conclusions about lateral flow directions cannot be made based on water levels from the existing monitoring well network.

It has been suggested that contaminants reaching the saturated zone beneath Camdenton will follow "regional groundwater flow" and discharge at the Lake of the Ozarks. However,

groundwater withdrawals averaging over 500,000 gallons per day will create a large cone of depression and obliterate "regional groundwater flow" in any Ozark ridge top setting. A 2-hour pump test of the new Hickory St. well at 550 gallons per minute (gpm) caused a 176-foot drawdown in water level. There is no evidence to suggest that potential contaminants reaching the water table from either the Former Hulett Lagoon or the Modine site can somehow escape the Camdenton well field.

Aquifer Discontinuities
Minor folds and faults in the area cannot be considered aquifer discontinuities. However, it should be noted that the Cambrian-age formations that form the most productive portions of the Ozark Aquifer beneath the site are highly variable in lithology. The aquifer cannot be considered isotropic, nor does it possess radial symmetry. Aquifer parameters may be so variable as to render groundwater modeling useless.

Wellhead Protection Area
Camdenton is located in Area 1, as designated by the DGLS Wellhead Protection Section. Since September 1987, Area 1 bedrock wells have been required to have 80 feet of casing and penetrate at least 30 feet of bedrock. Wells within ¼ mile of the Lake of the Ozarks are located in Sensitive Area B and subject to additional requirements.

Karst Features
The Camdenton area is considered karst. Significant karst features are present within a four-mile radius of the site. When MW-5 was drilled at the site, numerous fractures and small voids were encountered. Over 5,000 gallons of water was lost during the drilling of the monitoring well.

4.2 Groundwater Targets

Groundwater use within four miles of the site is extensive. At least 3,420 people are served by public wells in the area and an estimated 409 people are served by private wells. A detailed description of the well use follows.

Public Drinking Water Wells
The City of Camdenton currently utilizes three wells to supply drinking water to city residents: the Rodeo Grounds well, the Blair Heights well, and the Hickory well. The city also has a fourth well, the Mulberry well, that was taken off line on February 2, 1999 due to TCE contamination. The Mulberry well is currently used only as a standby well when any of the other three wells are not operating. Since February 2, 1999, the Mulberry well has been on-line twice. Due to electrical problems at the Blair well, Mulberry well was pumped from February 2 to the 9th, for a total of about 400,000 gallons. Due to problems with the water controls, Mulberry well was pumped from February 12 - 16th, for a total of 1,314 gallons (References 44; 45).

Table 3: Stratigraphic Column for Former Hulett Lagoon, Camden County (after Harvey et. al.,1983)							
System	**Aquifer Group**	**Approximate Site – Specific Thickness (ft)**	**Formation**	**Hydraulic Conductivity (cm/sec)**	**Regional Thickness (ft)**	**Dominant Lithology**	**Water-bearing Character**
Quaternary		8	Colluvium and residuum		0-90	Regolith of residual clay, sand, chert pebbles and cobbles	May contain small amounts of perched water.
Ordovician	Ozark Aquifer	0?	Roubidoux Formation	10^{-3}	0-90	Clayey residuum, sandstone and sandy dolomite	Not present in sufficient thickness in the Camdenton area to produce usable quantities of water.
		300	Gasconade Dolomite	10^{-6}	300-385	Cherty dolomite, minor sandstone, and shale	Yields moderate to large quantities of water to wells. Yields range from 20 to 75 gpm. Less-permeable Upper Gasconade may act as a leaky confining unit.
		25	Gunter Sandstone Member	10^{-4}	10-45	Sandstone	Contributes moderate to large quantities of water. Most wells open to other formations.
Cambrian		500?	Eminence Dolomite	10^{-5}	240-600?	Cherty dolomite	Yields 6-100 gpm, the average being about 20 gpm
		150?	Potosi Dolomite	10^{-4}	30-330	Dolomite; contains abundant quartz druse	Yields large quantities of water to wells. Yields range from 100 to 750 gpm.
	St. Francois Confining Unit	180	Derby-Doerun Dolomite	10^{-7}	80?-215	Shaley dolomites and shale	Reliable aquitard.
		80	Davis Formation	10^{-7}	50-380?		
	St. Francois Aquifer	160	Bonneterre Formation	10^{-5}	85-200	Dolomite and limestone	Generally used only in outcrop areas. May contribute additional 100-200 gpm to wells open to other formations.
		240	Lamotte Sandstone	10^{-5}	140-300	Sandstone and arkosic conglomerate	
Precambrian	Basement Confining Unit					Igneous and metamorphic rocks	Does not yield water to wells in this area

The Rodeo well is located on Rodeo Road, just over one mile southeast of the site. The Rodeo well was drilled in 1961 to a total depth of 940 feet with 450 feet of eight-inch steel casing. The pump is set at 420 feet. The yielding strata is the Potosi Dolomite of the Ozark Aquifer. Records show the well yields 380 gpm (Reference 44).

The Blair Heights well is located on Lakeview Drive, 0.7 of a mile south-southwest of the site. The Blair well was drilled in 1974 to a total depth of 1060 feet with 400 feet of ten-inch diameter steel casing. The pump is set at 450 feet. The yielding strata is the Potosi Dolomite of the Ozark Aquifer. Records show the well yields 100 gpm (Reference 44).

The Hickory well is located at the southwest end of Hickory Street, 0.8 of a mile east of the site. The Hickory well was drilled in 1998 to replace the Mulberry well. The Hickory well was drilled to a total depth of 1100 feet with 450 feet of eight-inch diameter steel casing. The pump is set at 500 feet. The yielding strata is the Potosi Dolomite of the Ozark Aquifer (Reference 44).

The Mulberry well is located south of Mulberry Lane, 0.25 of a mile south of the site. The Mulberry well was drilled in 1986 to a total depth of 900 feet with 400 feet of twelve-inch diameter steel casing. The pump is set at 350 feet. The yielding strata is the Potosi Dolomite of the Ozark Aquifer. Records show the well yields 600 gpm (Reference 44).

When in use, the Mulberry well was blended with the other two wells, with the Mulberry well being the largest producer. The City of Camdenton's Public Works Director reported that the Mulberry well was the lead well until July 1998. Before July 1998 the controls on the wells were set such that Mulberry well was always the first to run; the Blair and Rodeo wells only ran when the Mulberry well was not able to handle the demand. During that time, the Mulberry well supplied about 70% of the water to the system. New controls were installed in July 1998, and the city was able to set the time the wells came on. In response to the TCE contamination showing up in the well, the Mulberry well was set as the third well to come on. With the new controls the Mulberry well was cut back to supply only about 40% of the water to the system (Reference 45). The City of Camdenton's water supplies a total of 3,010 people (Reference 46, p. 14).

The Windsor Estate Nursing Home well is located on Highway 5, approximately 1.4 miles northwest of the site. The well was drilled in 1969 to a total depth of 600 feet with 400 feet of six inch casing (Reference 61). This well serves 70 people (Reference 32, p. 131).

The Linn Creek well is located on Highway 5, approximately 2.9 miles northeast of the site. The well was drilled in 1984 to a total depth of 860 feet with 528 feet of six inch steel casing (Reference 62). This well serves 260 people (Reference 32, p. 33).

The Southway Terrace Mobile Home Park well is located on Highway 5, 2.3 miles northwest of the site. The well was drilled in 1970 to a total depth of 550 feet with 350 feet of six inch steel casing (Reference 63). This well serves 85 people (Reference 32, p. 120).

TABLE 4: PUBLIC WELLS WITHIN A 4-MILE RADIUS OF THE FORMER HULETT LAGOON SITE		
Distance from Site	Name of Well	No. of People Served*
0 - 1/4	City of Camdenton's Mulberry Well	2,107†
1/2 - 1	City of Camdenton's Blair Well	1,003‡
	City of Camdenton's Hickory Well	1,003‡
1-2	City of Camdenton's Rodeo Well	1,003‡
	Windsor Estate Nursing Home	70
2-3	Linn Creek	260
	Southway Terrace MHP	85
TOTAL		3,425

* Reference 46, pp. 14, 33, 120, 131
† This represents the number of people apportioned to this well when it was in peak operation during the initial time period when TCE was detected in the well
‡ This represents the current situation in Camdenton without the Mulberry well operating

There are several drinking water wells within a four-mile radius of the site that are classified as transient, non-community water systems. They include mostly resorts and restaurants in the Lake of the Ozarks area. These wells, by definition, serve at least 25 different people at least 60 days out of the year (Reference 47). However, the number of people served by these wells will not be included in a count of potential targets due to the transient nature of the population.

Private Drinking Water Wells

Within four miles of the site, there are over 485 wells recorded in the DGLS databases. The LOGMAIN database contains information on older wells. The DGLS Well Wellhead Protection Section's Water Well Information System (W.I.M.S) database contains information on wells drilled since 1987. The vast majority of the wells on record are domestic supply wells. Some wells may no longer be active, and many active wells may not be recorded in DGLS databases. Table 5 illustrates the breakdown of private wells within four miles of the site (Reference 43). The population served by private wells was calculated using the estimated average persons per household in Camden County - 2.41 (Reference 48).

TABLE 5: PRIVATE WELLS REGISTERED WITH DNR WITHIN A 4-MILE RADIUS OF THE FORMER HULETT LAGOON SITE		
Distance From Site	Number of Private Wells	Estimated Population Served
0 - 1/4	1	2
1/4 - 1/2	-	-
1/2 - 1	2	5
1-2	27	65
2-3	59	142
3-4	81	195
TOTAL	170	409

4.3 Previous Sampling

Monitoring Wells

Modine Manufacturing Company has performed quarterly sampling of the monitoring wells on their site. The TCE concentrations in the monitoring wells are detailed in the table below (Reference 49).

TABLE 6: TCE CONCENTRATIONS IN MODINE GROUNDWATER MONITORING WELLS 1 - 5
All results in parts per billion
NT - Not tested ND - Not detected at or above 5 ppb NS - Not sampled due to insufficient volume

Date of Sampling	MW-1	MW-2	MW-3	MW-4	MW-5
09/02/92	ND	ND	These wells were not drilled until 1995.		This well was not drilled until 1998.
12/07/94	6.9	5.1			
08/16,22/95	11.8	ND	8	88.9	
11/16/95	9.4	ND	ND	142	
02/15,16/96	ND (duplicate 5.4)	ND	6.6	173	
05/16/96	ND	ND	ND	10	
08/20/96	ND	NT	ND	NS	
12/12/96	ND	NT	NS	NS	
02/28/96, 03/0397	NT	NT	ND	34	
06/04/97	NT	NT	NT	120	
07/16/98	These wells were not sampled at this time. This was during the installation of MW-5.				484.1

Public Drinking Water

Table 7, on the following page, shows the history of TCE detections in the City of Camdenton's public drinking water wells. The first time TCE showed up in the Mulberry well was in March of 1993. The sample was collected by the Missouri Department of Health and analyzed at Continental Analytical Services, Inc. (Reference 50).

The DNR requires public drinking water wells be tested for volatile organic compounds every three years. DNR mails sampling containers to the public water supply office, and then a designee, in the City of Camdenton's case, the Public Works Director, collects the sample and sends it to DNR for analysis. When a contaminant is detected, sampling frequency is then increased to quarterly and sometimes monthly. If the running annual average concentration of the contaminant exceeds the MCL, the public system is in violation of the drinking water standard.

The first sample analyzed by DNR in which TCE was detected at the Mulberry well was in January 1997. During sampling in 1997, there was only one sample that exceeded the MCL (February's sample was 5.2 ppb), but the running annual average for that year was below the MCL. In 1998, the levels of TCE began to increase (Reference 50). At that time, the city began looking at options to replace the Mulberry Well. In May 1998, the city

announced they were in the process of planning for a new well to be drilled on Hickory Street to replace the Mulberry Well (Reference 51). In addition, in July 1998, the City of Camdenton installed new regulating controls on their drinking water wells that allowed them to cut back the usage of the Mulberry Well. It went from supplying about 70% of the water when blended with the other two wells, to supplying about 40%. In February 1999, the new Hickory well went on line and the Mulberry well was shut off (Reference 45).

TABLE 7: TCE RESULTS FROM SAMPLING AT CITY OF CAMDENTON'S PUBLIC DRINKING WATER WELLS
Results in parts per billion

Date of Sampling	Mulberry Well	Rodeo Well	Blair Well
03/16/93	2.1	<0.5	<0.5
04/27/94	<0.5	<0.5	<0.5
01/29/97	3.8	3.9*	<0.5
02/17/97	5.2	<0.5	<0.5
03/12/97	3.8	<0.5	<0.5
06/03/97	4.5	<0.5	<0.5
08/26/97	4.3	<0.5	<0.5
12/01/97	4.4	<0.5	<0.5
02/02/98	6.3	<0.5	<0.5
02/17/98	5.2	<0.5	<0.5
03/25/98	3.6	<0.5	<0.5
04/23/98	4.1	<0.5	<0.5
05/21/98	11.8	<0.5	<0.5
06/08/98	5.1	<0.5	<0.5
08/25/98	4.2	<0.5	<0.5
12/02/98	4.4	<0.5	<0.5
01/13/99	26.2	<0.5	<0.5

* The Rodeo well is over one mile from the Hulett lagoon. It is unknown whether this TCE detection was a valid result, especially since all subsequent samples were non-detect for TCE.

Private Wells

On April 23, 1998, DNR collected a groundwater grab from a private well at 178 Sunset Drive. The sample was analyzed for VOCs. Cis-1,2-dichlorethene was detected at 12 ppb and TCE was detected at 210 ppb. At that time, the owner was using the well only for lawn watering; the home was hooked up to the city water line for drinking water (Reference 52).

In July 1992, as part of the SI conducted at the 179 Sunset Drive facility, three samples were collected from private wells located near the Lake of the Ozarks. Two of the wells were located in Normac Estates, 1.8 miles west-southwest of the site. The third well was located 1.3 miles southwest of the site. No VOCs were detected in any samples (Reference 36).

4.4 Sampling Locations

Groundwater samples for the PA/SI were collected on January 6-7, 1999. Five monitoring wells, two public water supply wells, and two private drinking water wells were sampled. Figure 3 shows sample locations for all groundwater samples collected as part of the Hulett Lagoon PA/SI (Reference 38).

Monitoring Wells 1 & 2
Layne-Western Company, Inc., was subcontracted by DNR for the installation of Monitoring Wells #1 and #2 on the Modine Manufacturing Company property (then known as Modine Heat Transfer). The wells were installed in July 1992 during the SI performed at the 179 Sunset Drive facility. MW-1 is located on the west side of the facility. MW-2 is located northeast of the facility. Total well depth of MW-1 was 178 feet and MW-2 was 197 feet. The wells were constructed with two-inch diameter, polyvinyl chloride (PVC) inner well casing, with steel outer well casing. Both wells have 40 feet of screen at the bottom of the well (References 36; 53).

On January 7, 1999, sample 991464 was collected from MW-1 and sample 991463 was collected from MW-2. Depth to water recorded at 153.2 feet from the top of the casing in MW-1. Depth to water recorded at 165.7 feet from the top of the casing in MW-2 (Reference 38).

Monitoring Wells 3 & 4
Layne-Western Company, Inc. of St. Louis was subcontracted by Dames & Moore, consultant for Modine Manufacturing Company, for the installation of Monitoring Wells #3 and #4. Drilling took place from August 8-14, 1995. MW-3 was installed on August 8, 1995, south of the Modine facility. MW-4 was installed on August 11, 1995, just northwest of the facility. MW-3 is 167 feet deep with 64 feet of five-inch diameter steel surface casing. MW-4 is 158 feet deep with 44 feet of five-inch diameter steel surface casing. Both wells are open hole below their casing (Reference 54, p. 35).

On January 7, 1999, sample 991460 was collected from MW-3 and samples 991461 and 991462 were collected from MW-4. Sample 991461 was collected via a submersible pump and 991462 was collected via dedicated bailer. The two different methods for collection were used for comparison purposes. All other groundwater samples from monitoring wells were collected with a dedicated bailer. Depth to water recorded at 153.1 feet from the top of the casing in MW-3. Depth to water recorded at 158.5 feet from the top of the casing in MW-4 (Reference 38).

Monitoring Well 5
Layne-Western Company, Inc. of St. Louis was subcontracted by Dames & Moore, consultant for Modine Manufacturing Company, for the installation of Monitoring Well #5. The well was installed just outside what would have been the southwest edge of berm of the Hulett lagoon. Drilling took place from July 7-10, 1998. The well was installed to

determine the presence or absence of volatile organic compounds, in particular, TCE, in the groundwater underlying the former Hulett lagoon. The well was drilled to a total depth of 118 feet below ground surface (bgs). Permanent surface casing was installed in bedrock to a depth of 37 feet bgs. This was done to case off several void spaces that had been encountered during drilling, most notably a void space from 35.0 to 36.5 feet bgs. The well was constructed with schedule 80, two-inch diameter, PVC casing with 30 feet of a 0.01 inch slotted screen. Water was encountered at a depth of 105 feet bgs (Reference 55).

On January 7, 1999, samples 991465 and 991466 (duplicate) were collected from MW-5. Depth to water recorded at 102.7 feet from the top of the casing in MW-5 (Reference 38).

Public Wells
Sample #991458 was collected from the City of Camdenton Blair well. The Blair well was considered a background well for PA/SI purposes since previous sampling has shown this well not to be contaminated. However, groundwater flow direction has not been definitively determined; the cones of depression created by the city's wells could significantly affect groundwater flow in the area. Sample #991459 was collected from the City of Camdenton Mulberry well, known to be contaminated with TCE (Reference 38).

Private Wells
Sample 991452 and 991453 (a duplicate) were collected from a residential well, located at 178 Sunset Drive, approximately 790 feet southwest of the site. This well is currently not used for any purpose. When the well was sampled in April 1998 and found to be contaminated with TCE, the owner discontinued use, which at that time was only for watering his lawn. No information is known about the well (Reference 38).

Sample 991457 was collected from a residence in Normac Estates, located 1.8 miles west-southwest of the site on the lakefront of the Lake of the Ozarks. No information is known about the well (Reference 38).

4.5 Analytical Results (Reference 38)

All groundwater samples for the PA/SI were analyzed for total and/or dissolved metals (arsenic, barium, cadmium, chromium, copper, mercury, nickel, lead, selenium, silver), and VOCs. The analytical results for all groundwater samples are detailed in the tables on the following page.

Monitoring Wells

TABLE 8: SELECTED GROUNDWATER RESULTS FROM PA/SI SAMPLING AT MODINE MONITORING WELLS 1 - 5

All results in parts per billion NA - not analyzed
* 991461 was collected via submersible pump, 991462 was collected via dedicated bailer
Bolded results are those above the EPA MCL.

CHEMICAL	MW-1	MW-2	MW-3	MW-4		MW-5		EPA
	991464	991463	991460	991461*	991462*	991465	991466	MCL
METALS								
Arsenic, total	<1.2	<1.2	6	<1.2	NA	<1.2	<1.2	50
Barium, dissolved	49.7	91	69.6	81.6	NA	55.7	51.6	2000
Barium, total	58.2	112	151	88.3	NA	67.9	71.3	
Cadmium, total	<1.0	<1.0	2.26	<1.0	NA	1.25	1.97	5
Chromium, total	3.84	14.3	45.7	5.52	NA	9.39	13.3	100
Copper, total	6.94	7.85	51.2	<5.0	NA	7.52	8.97	1300
Nickel, total	<3.0	8.45	29.7	7.61	NA	5.16	4.26	100
Lead, total	14.1	**37.2**	**97.6**	**38.7**	NA	12.7	**15.3**	15
VOCs								
Cis-1,2-dichloroethene	<0.5	<0.5	<0.5	2.1	2.3	35	23	70
Trichloroethene	**10.1**	2.5	<0.5	**64.1**	**76.5**	**1400**	**1500**	5

For purposes of the PA/SI and according to HRS guidelines, any of MW's 1 through 4 could be considered background for the MW-5. Although previous and current sampling has shown that MW's 1 through 4 have been, or presently are, within the boundaries of the TCE plume, the TCE contamination in MW-5 exceeds three times the TCE concentration in any of the other monitoring wells. Additionally, however, all five monitoring wells are not entirely similar in construction. MW's 3 and 4 are open hole borings below their casing, while MW's 1, 2 are screened for 40 feet; MW-5 is screened for 30 feet. MW-1 is 60 feet deeper than MW-5; and MW-2 is 79 feet deeper than MW-5. Although the intervals from which water is drawn in the monitoring wells is not entirely similar, all five wells draw water from the Gasconade Dolomite formation of the Ozark Aquifer.

Public and Private Drinking Water Wells

TABLE 9: SELECTED GROUNDWATER RESULTS FROM PA/SI SAMPLING AT PUBLIC AND PRIVATE GROUNDWATER WELLS

All results in parts per billion

CHEMICAL	Camdenton Blair Well (Background)	Camdenton Mulberry Well	Sunset Drive Private Well		Normac Estates Private Well	EPA MCL
	991458	991459	991452	991453	991457	
METALS						
Barium, total	45.3	45.3	67.5	66.6	62.8	2000
Copper, total	21.7	31.7	27.5	16.3	44.7	1300
Nickel, total	<3.0	<3.0	11.2	60.4	<3.0	100
Lead, total	4.4	**15.7**	<2.5	<2.5	<2.5	15
VOCs						
Cis-1,2-dichloroethene	<0.5	<0.5	13	13	<0.5	70
Trichloroethene	<0.5	**5.3**	**240**	**230**	<0.5	5

For purposes of the PA/SI, the Camdenton Blair well was chosen as a background well for the contaminated Mulberry well. The two wells are similar in total depth and both draw from the Potosi Dolomite formation of the Ozark Aquifer. The Mulberry well could in fact serve as its own background since the well was regularly monitored as a public well under Missouri regulations, and was non-detect for TCE until 1997 (except for one sample in 1993 collected by the Missouri Department of Health).

4.6 Conclusions

PA/SI sampling has documented an observed release of TCE to the Ozark Aquifer in the area of the Former Hulett Lagoon site. MW-5, located immediately near the lagoon, contained TCE at 1,400 ppb. The City of Camdenton's Mulberry well, located less than 0.25 of a mile south of the lagoon showed 5.3 ppb TCE during PA/SI sampling on January 6, 1999.

The City of Camdenton officially took the Mulberry Well off line on February 2, 1999 due to the TCE contamination. When in use during the initial time period when TCE was detected, the Mulberry Well was the highest producing well of Camdenton's system, supplying an apportioned 2,107 people. The well is now a reserve well, to be used only when power is down at any other Camdenton Wells. There are three wells currently serving the city within two miles of the site. The City of Camdenton's drinking water wells supply an estimated 3,010 people.

There are two sources of TCE that could be attributed to the contamination present in the City of Camdenton's Mulberry Well. PA/SI sampling has shown the former Hulett lagoon contains TCE contaminated soil, as well as groundwater, at the lagoon site. The lagoon is located approximately 1100 feet north of the Mulberry well. The manufacturing facility at 179 Sunset Drive has also been shown to contain TCE contaminated soil as well as TCE contaminated groundwater. The facility is located approximately 500 feet northwest of the Mulberry Well. It is unknown at this time whether the Mulberry Well contamination is due in whole or in part to the lagoon contamination. Information on groundwater flow direction is inconclusive. DNR's DGLS geologists suggest that the cone of depression created by the Mulberry well, when in operation, influenced groundwater flow in that direction. Now that the Mulberry well has been shut off, groundwater flow is expected to move toward another city well, most likely the Blair well.

5.0 SURFACE WATER PATHWAY

5.1 Hydrologic Setting

The site is situated within the Salem Plateau region of the Ozark Plateau physiographic province. The topography of the Salem Plateau is characterized by a rolling upland surface with rugged hills dissected by entrenched, narrow stream valleys. Karst features,

such as springs, sinkholes, and losing streams, are characteristic of the Salem Plateau (Reference 43).

The Former Hulett Lagoon site is situated near the headwaters of a small unnamed stream which drains southwest to the Niangua Arm of the Lake of the Ozarks. During operation, the Hulett lagoon's receiving stream was identified as a tributary to Jarvis Hollow. The site of the former lagoon has been leveled, while the surrounding terrain exhibits moderate natural relief (5% to 9% slopes). East of the site lies the City of Camdenton. West of the site, the landscape is more rugged, and forests extend down to the Lake of the Ozarks. The natural landforms and drainage patterns at the site have been obscured by lagoon construction and, later, by soil removal actions (Reference 43).

Below the site, the receiving stream is fairly steep and the bedload consists mostly of cobbles and gravel. In 1992, a DGLS geologist with the Water Resources Program examined area streams as part of oversight for an investigation at the 179 Sunset Drive facility. He reported that the Former Hulett Lagoon site is located on the valley floor of the "northeast branch" of an unnamed tributary to Jarvis Hollow. The "southeast branch" of the tributary drains the facility at 179 Sunset Drive. The northeast and southeast branches join near the western corporate boundary of the City of Camdenton, approximately 0.6 miles downstream of the Former Hulett Lagoon site. The lagoon was constructed near the headwaters of the northeast branch, just west of the ridge top where most of Camdenton is located. Water runs onto the site from the upper section of the northeast branch. This channel has been diverted around the northern edge of the former lagoon (Reference 43).

Run-off from the site, entering the northeast branch, flows toward the west for ¼ mile. Runoff then flows southwest approximately 1.6 miles and enters Jarvis Hollow in the NE ¼, NE ¼, SE1/4 of Section 34, Township 38 North, Range 17 West. According to the 7.5 minute HaHaTonka topographic map, the 0.15-mile-long stream segment below this confluence appears to be perennial. Thus, the confluence of the unnamed tributary and the stream in Jarvis Hollow is considered the probable point of entry (PPE) to surface water. Runoff from the Former Hulett Lagoon reaches the Lake of the Ozarks 1.97 miles downstream of the site (Reference 43).

The DGLS geologist noted that the unnamed tributary lost flow in some locations, especially when encountering the Gunter Sandstone. However, it was anticipated that any flow lost in the streambed would stay in the valley. Very little rainfall is necessary to generate surface flow throughout the reach of the stream. The receiving stream for the Former Hulett Lagoon Site has not been officially classified by DGLS, but based on available reports, the stream should be considered losing. The Gasconade Dolomite that forms much of the streambed is not particularly karst. Many nearby streams have been classified as losing (Reference 43).

The 15-mile downstream limit ends near Shepard Cove on the Osage River Arm of the Lake of the Ozarks, approximately 29.5 miles above Bagnell Dam. This point is located

on the Camdenton, MO 7.5-minute quadrangle; SE ¼, Section 24, T. 39 N., R. 17 W. The Osage River flows in a northeasterly direction, toward the Missouri River (References 43; 3).

The site is most likely not located in a flood plain, as it is located at an elevation of approximately 285 meters above mean sea level, while Lake of the Ozarks is at 198 meters above sea level (Reference 3).

5.2 Surface Water Targets

The Lake of the Ozarks is a 59,520 acre lake classified as a major reservoir. The lake is designated for use as livestock and wildlife watering, protection of warm water aquatic life and human health/fish consumption, whole body contact recreation, and boating and canoeing (Reference 56, pp. 11, 35). There are no drinking water intakes on the Lake of the Ozarks (Reference 46, p. 200).

The federally-listed Endangered gray bat is known to occur on the Lake of the Ozarks in Section 2 of T 38 N, R 18 W. The bats forage over streams, rivers, and reservoirs in this part of Missouri (Reference 57).

The federally-listed threatened Bald Eagle winters at the Lake of the Ozarks. Bald eagles generally forage on fish, dead and dying waterfowl, and carrion. Eagles can be adversely affected by heavy metals, bacteria, and other contaminants. Due to the scavenger behaviors of the eagle, they often feed on dead or dying prey that may have been poisoned in some way or may have elevated bacterial levels. In such cases, eagles can be affected through a secondary pathway in the food chain which could harm or kill individuals (Reference 58).

According to National Wetlands Inventory maps prepared by the U.S. Department of the Interior/Fish and Wildlife Service (aerial photography from 1984), the first 0.6 of a mile of the creek bordering the lagoon is a wetland. The remaining portion of the creek leading to the Lake of the Ozarks may be considered a wetland if emergent hydrophytes are present. There are numerous wetlands in and bordering the Lake of the Ozarks (Reference 59).

5.3 Surface Water Conclusions

All surface runoff from the lagoon area enters the tributary to Jarvis Hollow stream that borders the west side of the lagoon. This stream received overflow from the lagoon during operation; thus TCE was historically released to the creek. However, the stream bed near the site is gravel, making sampling impractical. It has been ten years since the lagoon was closed; it is unlikely any TCE would be left in any surface material, soil or sediment, present in other parts of the stream. Since TCE is a DNAPL, the majority of what entered the stream would have infiltrated into the subsurface by now. Current site conditions

indicate the risk from any site surface runoff would be low since the TCE found in the soil at the lagoon was from the four to seven foot depth.

6.0 SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

The native soil in the vicinity of the Former Hulett Lagoon site was the Clarksville-Gepp very cherty silt loam. The Clarksville-Gepp soils are deep, well-drained soils typical of sloping uplands. Permeability is moderate. The content of organic material is moderately low. The shrink-swell potential is moderate. Grass at the site limits wind erosion (Reference 43).

The one acre former lagoon area is an open field area with grassy vegetation. The only structure on-site is Monitoring Well #5, located on the southwest corner of the lagoon's former berm. The lagoon area is relatively flat. During closure, the majority of the sludge was removed and the berms were turned into the middle. Apparently, some of the material from the hill bordering the southeast and east side of the lagoon was scraped in toward the lagoon during closure, but no fill was brought in (Reference 5).

Access is not restricted to the site; there is no fencing. The gravel access road from West Mulberry is not maintained; there are several severe ruts caused from washouts. There have been reports that illegal dumping is occurring on Ron Hulett property along the north and south side of the access road. There were a few pieces of trash in the lagoon area (Reference 5).

6.2 Soil and Air Targets

Residential areas are located immediately north and south of the site. North of the site is an apartment complex; south of the site is one apartment building and several homes. At least two of the apartment buildings in the complex north of the site are within 200 feet of the site, as well as the apartment building and one home south of the site (Reference 5).

The City of Camdenton has an estimated population of 2,544 people (Reference 48, p. 144). Table 10, on the following page, illustrates the breakdown of the number of people estimated to be within a four-mile radius of the site (Reference 60).

TABLE 10: ESTIMATED POPULATION WITHIN A 4-MILE RADIUS	
RADIUS	POPULATION
ON-SITE	0
0 - 1/4	180
1/4 - 1/2	696
1/2 - 1	1,267
1 - 2	1,100
2 - 3	1,280
3 - 4	1,405
TOTAL	5,928

The federally-listed Endangered gray bat is known to occur in Section 2 of T37N, R17W, which is between 2 and 3 miles from the site (Reference 57).

6.3 Soil and Air Conclusions

All soil samples collected as part of the PA/SI were waste/source samples. The TCE contamination in the lagoon is documented in the four to seven foot depth zone. There were no surface soil samples collected from the lagoon area because the majority of the sludge in the lagoon was removed and the majority of TCE near the surface would have volatilized or moved down through the soil profile in the ten years since closure of the lagoon. The potential for possible trespasser exposure to any of the TCE contaminated soil on the site is considered minimal. There are no people living on site, although there are three apartment buildings and one home that are within 200 feet of the site. Access to the site is not restricted. The reports of unauthorized dumping in the area near the lagoon indicate site security may be warranted.

7.0 SUMMARY AND CONCLUSIONS

The Former Hulett Lagoon site is located in the City of Camdenton, 500 feet northeast of the intersection of Dawson Road and Sunset Drive. The site is a closed wastewater lagoon owned and operated by the City of Camdenton. The Hulett lagoon, approximately one acre in size, was one of five municipal lagoons that serviced the City of Camdenton. It was the only lagoon that received industrial effluent in addition to domestic sewage. The lagoon was in operation from 1961 until its closure in late 1989.

From 1967 through 1986, Dawson Metal Products (1967 to 1972) and Sundstrand Tubular Products (1972 to 1986) operated a manufacturing facility that released untreated wastewater into the lagoon. The facility is located approximately 1000 feet southeast of the lagoon at 179 Sunset Drive. The untreated wastewater was known to have contained

several hazardous waste streams, most notably TCE. During closure in 1989, over 2,000 pounds of sludge was removed from the lagoon.

Environmental investigations of the manufacturing facility at 179 Sunset Drive started in 1990 when Modine Manufacturing Company was considering buying the property. About that time DNR received a complaint alleging that 4,500 gallons of TCE had been spilled at the facility. Since that time, there have been numerous investigations conducted at the 179 Sunset Drive facility, including a PA and SI conducted by DNR. The current owner, Modine Manufacturing Company, is presently negotiating a Resource Conservation and Recovery Act (RCRA) Corrective Action Abatement Order on Consent (AOC) through the Permits Section of DNR's HWP. The AOC calls for investigation to determine the nature and extent of contamination on the facility property. However, investigation of the Hulett Lagoon could not be included in the AOC due to a RCRA domestic sewage exemption. Thus, the Former Hulett Lagoon site was referred to Superfund to be addressed under CERCLA.

Waste/Source Sampling

Although over 2,000 cubic yards of sludge were removed from the lagoon during closure in 1989, PA/SI sampling, as well as previous sampling, document that TCE contaminated soil still remains in the lagoon area. Three samples, collected for the PA/SI near the previous location of the outfall pipe, contained TCE at 9.5 ppm, 0.24 ppm and 0.12 ppm. With such high levels of TCE documented in groundwater at the site (1,400 ppb), it is presumed that the majority of TCE, once deposited in the lagoon, has infiltrated into the bedrock. However, the TCE contaminated soil that remains in the lagoon may be a continuing source of contamination.

Groundwater

PA/SI sampling has documented an observed release of TCE to the Ozark Aquifer in the area of the Former Hulett Lagoon site. MW-5, located immediately near the lagoon, contained TCE at 1,400 ppb. The City of Camdenton's Mulberry well, located less than 0.25 of a mile south of the lagoon showed 5.3 ppb TCE during PA/SI sampling. The Mulberry well was taken off line on February 2, 1999 due to the TCE contamination. When in use during the initial time period when TCE was detected, the Mulberry Well was the highest producing well of Camdenton's system, supplying an apportioned 2,107 people. There are three wells currently serving the city within two miles of the site. It is estimated that the TCE groundwater plume will begin moving toward the city's Blair well now that the Mulberry well has been shut off. The cone of depression created by pumping the Blair well, located 0.7 of a mile south-southwest, may influence the migration of the plume. The City of Camdenton's drinking water wells supply an estimated 3,010 people.

In addition to the Hulett lagoon, there is another source of TCE contamination that could be contributing to the groundwater plume that affected the City of Camdenton's Mulberry well. The manufacturing facility at 179 Sunset Drive has also been shown to contain TCE contaminated soil as well as TCE contaminated groundwater. The facility is located

approximately 500 feet northwest of the Mulberry Well. It is unknown at this time whether the Mulberry Well contamination is due in whole or in part to the lagoon contamination.

Surface Water
All surface runoff from the lagoon area enters the tributary to Jarvis Hollow stream that borders the west side of the lagoon. This stream received overflow from the lagoon during operation; thus TCE was historically released to the creek. However, the streambed near the site is gravel, making sampling impractical. It has been ten years since the lagoon was closed; it is unlikely any TCE would be left in any surface material, soil or sediment, present in other parts of the stream. Current site conditions indicate the risk from any site surface runoff would be low since the TCE found in the soil at the lagoon was from the four to seven foot depth.

Soil and Air
The potential for possible trespasser exposure to any of the TCE contaminated soil on the site is considered minimal. There are no people living on site, although there are three apartment buildings and one home that are within 200 feet of the site. Access to the site is not restricted. The reports of unauthorized dumping in the area near the lagoon indicate site security may be warranted.

8.0 RECOMMENDATIONS

The TCE groundwater contamination at the Former Hulett Lagoon site warrants remedial action. The contamination has already caused the closure of the one of the city's public drinking water wells, and the remaining wells are now at risk. Hydraulic control will need to be achieved at the source of the plume to prevent the migration of TCE to the other nearby wells, specifically the Blair well. Current investigation and remedial actions are ongoing at the 179 Sunset Drive facility, however, these activities do not include and will not address the Hulett lagoon contamination.

Although the majority of the sludge from the lagoon was removed, TCE contaminated soil remains. This contaminated soil may warrant removal. At a minimum, access to the site should be restricted.

Using the Hazard Ranking System (HRS) to evaluate site conditions, the Former Hulett Lagoon site scores above 28.5 and qualifies for proposal to the National Priorities List (NPL). The closing of a public drinking water supply well due to contamination from the site is a significant factor in this site evaluation.

Prepared by:

Valerie H. Wilder
Environmental Specialist
Site Evaluation Unit

Reviewed by:

Julieann Warren
Chief
Site Evaluation Unit

Approved by:

Gary T. Behrns
Chief
Superfund Section

REFERENCES

1. U.S. Environmental Protection Agency Hazard Ranking System, 40 CFR Part 300, Appendix A, 55 FR 51583, December 14, 1990.

2. U.S. Environmental Protection Agency, September, 1995, Superfund Chemical Data Matrix.

3. U.S. Geological Survey, 7.5-Minute Series. Topographic Maps. Camdenton, MO 1983, Decaturville, MO 1975, Green Bay Terrace 1983, HaHaTonka, 1982.

4. Missouri Department of Natural Resources, DEQ, Appendix A. Locational Data Collection Sheet. January 21, 1999. 2 pages.

5. Wilder, Valerie H., Environmental Specialist, HWP, DEQ, DNR to Former Hulett Lagoon and Camdenton Sludge Disposal Technical Files. Memo. Site Visits/Sampling Events on December 1, 16, 1998 and January 21-22, 29, 1999. February 1, 1999. 3 pages.

6. United States Department of Agriculture. Soil Conservation Service. Soil Survey of Camden County, Missouri. March 1994. 127 pages.

7. United States Department of Commerce. National Weather Service Office for State Climatology. Technical Paper No. 40. Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years. 1961.

8. United States Department of Commerce. Climatic Atlas of the United States. June 1968.

9. Jacobs Engineering Group, Inc. Final Environmental Priorities Initiative/Preliminary Assessment. Modine Heat Transfer, Inc. (Formerly Sundstrand Tubular Products) September 1992. 58 pages plus Figures, Tables, and Appendices.

10. Missouri Department of Natural Resources. Missouri Water Quality Basin Plans. Volume 4. Osage and Gasconade Rivers (Including Lake of the Ozarks, Truman Reservoir, South Grand, Little Osage, Marmaton, Marais des Cygnes, Sac and Pomme de Terre Rivers, Tebo Creek and Big Piney River). 102 pages.

11. B. R. Kesler, Regional Administrator, DEQ, JCRO to Trudy Marco, Grants Coordinator, Camdenton, MO. Audit Report and Checklist. June 20, 1986. 13 pages.

12. Victoria M. Haines, Environmental, Health & Safety Counsel, Sundstrand to Valerie Wilder, HWP, DEQ, DNR. Letter. February 5, 1999. 7 pages plus Attachments.

13. State of Delaware, Office of Secretary of State. Certificate of Incorporation, Dawson Metal Products, Inc. June 12, 1972. 1 page

14. State of Missouri, James C. Kirkpatrick, Secretary of State. Certificate of Authority, Dawson Metal Products, Inc. No. F-157085. September 25, 1972. 1 page.

15. State of Missouri, Office of Secretary of State. Application for an Amended Certificate of Authority for a Foreign Corporation, Sundstrand Tubular Products, Inc., (formerly Dawson Metal) May 25, 1977. 2 pages.

16. Missouri Department of Natural Resources. Corrective Action Abatement Order on Consent to Modine Manufacturing Company, 179 Sunset Drive, PO Box 636, Camdenton, MO 65020. 20 pages.

17. State of Missouri, Roy D. Blunt, Secretary of State. Certificate of Withdrawal, Sundstrand Tubular Products, Inc. No. F00157085. April 18, 1991. 1 page.

18. Law Environmental, Inc. Project No. 53-1543. Environmental Site Assessment, Modine Heat Transfer, Inc. November 1991. 5 pages plus Tables, Figures and Appendices.

19. Todd Crawford, Environmental Engineer to the Honorable Ken Mensendiek, Mayor, City of Camdenton. Letter. September 13, 1978. 1 page.

20. John W. Whitfield, Geologist and Gary St. Ivany, Lab Technician, applied Engineering & Urban Geology. Engineering Geologic Report on Collapse Potential of Camdenton Lagoons. September 14, 1978. 1 page.

21. James O. Jackson, P.E. to Frank Dolan, P.E., Environmental Engineer, DNR. Letter. Test Results from Camdenton. June 21, 1984. 7 pages.

22. Warren W. Riley, Jr., City Administrator, City of Camdenton to Frank Dolan, DNR. Letter. Second Sample Results. August 20, 1984. 4 pages.

23. Donald Roger Elder, City Administrator, City of Camdenton to Leora M. Reising, Environmental Specialist, JCRO, DNR. Letter. May 27, 1986. 1 page.

24. Missouri Department of Natural Resources, Missouri Clean Water Commission. Construction Permit. Permit Number 2263. 2 pages.

25. Missouri Department of Natural Resources, Laboratory Services Program, DEQ. Pretreatment Monitoring Report, Sundstrand Tubular Products, Inc. April 30, 1987. 3 pages.

26. Charles Ray, Missouri Engineering Corp. to Dave Friese, Water Pollution Control Program, DNR. Letter. Sludge Analysis Report. April 25, 1988. 1 page.

27. David Freise, P.E., Project Engineer to the Honorable Mac Webster, Mayor, City of Camdenton. Letter. IDG - 011 Camdenton, MO Lagoon Closure. May 26, 1988. 1 page.

28. David Freise, P.E., Project Engineer to the Honorable Mac Webster, Mayor, City of Camdenton. Letter. IDG - 011 Hulett Lagoon. November 2, 1989. 1 page.

29. Missouri Engineering Corporation. Specifications and Contract Documents Removal and Stockpiling of Sludge from the Hulett Lagoon Camdenton, Missouri. March 1989. 17 pages.

30. Charles Ray, Missouri Engineering Corporation. Sludge Removal Project Hulett Lagoon - Camdenton, MO. July 21, 1989. 2 pages.

31. Kay Cyrus to Camdenton City Council. Regarding November 1, 1989, letter from Charles Ray, Missouri Engineering Corporation to Dave Welch, Attorney. 3 pages.

32. Ron McCormick to Mr. Hixson and Council Members. Letter. Cost Overrun in the Hulett Lagoon Project. October 20, 1989. 1 page.

33. Kent L. Hixson, City of Camdenton to Ronnie Testerman, DNR. Letter. Hulett Lagoon Sludge Disposal Work Completion Summary. April 9, 1990. 1 page.

34. Kent L. Hixson, City Administrator, City of Camdenton to Paul Kieler, Jacobs Engineering Group. Letter. Hulett Lagoon Closure Process. March 23, 1992. 1 page.

35. Department of Natural Resources, HWP. Preliminary Assessment Sundstrand Camden County, Missouri. January 31, 1992. 10 pages.

36. Missouri Department of Natural Resources, Environmental Services Program. Site Sampling Report Sundstrand Site Camdenton MO July 20 through July 31, 1992. December 31, 1992. 41 pages.

37. Arthur H. Groner, Chief, Permits Section, HWP, DEQ, DNR to Gary Behrns, Chief, Superfund Section, HWP, DEQ, DNR. Former Hulett Lagoon, Camdenton, Missouri September 8, 1998. 4 pages.

38. Allen, Brian J., Missouri Department of Natural Resources, Environmental Services Program. Combined Preliminary Assessment/Site Inspection Sampling Report Former Hulett Lagoon Site Camdenton, Missouri, Camden County. Field Activities Conducted January 6-7, 1999, January 21, 1999. 44 pages.

39. U.S. Department of Health & Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Trichloroethylene. February 20, 1996. 261 Pages.

40. Office of Emergency & Remedial Response, U.S. EPA. Estimating Potential for Occurrence of DNAPL at Superfund Sites. January 1992. 9 Pages.

41. Miesche M. Francis, Assistant Geologist, and Daniel J. Price, P.G., Senior Geologist, Dames and Moore to Richard Nussbaum, P.E., Groundwater Enforcement Unit Chief, HWP, DEQ, DNR. Letter Report. Subsurface Investigation Former Hulett Lagoon Camdenton Missouri Dames & Moore Job NO. 27397-023-045 November 4, 1996. 22 pages.

42. Missouri Department of Natural Resources, Division of Environmental Quality, Hazardous Waste Program. Cleanup Levels for Missouri (CALM). September 1998. 31 pages plus Appendices, Figures, Tables and Attachments.

43. Elfrink, Neil, Geologist, Environmental Geology Section, GSP, DGLS, DNR to Valerie Wilder, Environmental Specialist, Superfund Section, HWP, DEQ, DNR. Memo. Hydrogeologic Report for the Former Hulett Lagoon Site. March 12, 1999. 11 pages.

44. CARES, University of Missouri - Columbia and Missouri Department of Natural Resources, Public Drinking Water Program. Public Drinking Water Map - Camdenton 3010130, 6 Wells, 2 Chemical Sites, 1 Dealership, Camden County. February 24, 1999. 4 pages.

45. Vincent Costa, Director of Public Works, to Valerie Wilder, HWP, DEQ, DNR. Letter. February 24, 1999. 3 pages.

46. Missouri Department of Natural Resources, Division of Environmental Quality. Inventory of Missouri Public Water Systems. 1998. 211 pages.

47. CARES, University of Missouri - Columbia and Missouri Department of Natural Resources, Public Drinking Water Program. Public Drinking Water Map - Camden County, Missouri. January 1996.

48. U.S. Department of Commerce, Bureau of the Census. 1990 Census of Population and Housing. Summary Population and Housing Characteristics, Missouri. 1990 CPH-1-27. August 1991. 2 pages.

49. Thomas S. Sanicola, Environmental Engineer, Modine Manufacturing to Darleen Westcott, Environmental Engineer, HWP, DEQ, DNR. Letter. July 2, 1997. 9 pages.

50. Continental Analytical Services, Inc., and DNR Environmental Services Program. Sample Results. March 16, 1993. 42 pages.

51. Miller, Joyce L. Lake Sun-Leader, Camdenton, MO. Newspaper Article. Plant Under DNR Gun. May 23, 1998. 1 page.

52. Department of Natural Resources, Environmental Services Program. RCRA Sampling Investigation Report. Modine Site - Burnau Private Well, Camdenton, MO. April 23, 1998. 8 pages.

53. Starbuck, Edie. Division of Geology and Land Survey. Monitoring Well Installation for Sundstrand PA/SI. Geologic Drill Log. November 9, 1994. 8 pages.

54. Kump, Chris, Environmental Engineer, Groundwater Unit, Hazardous Waste Program, DNR. Comprehensive Groundwater Monitoring Evaluation, Modine Manufacturing Company, Camdenton, Missouri. January 1998. 44 pages plus Appendices.

55. Price, Daniel J., R.G., Managing Principal, St. Louis Office, Dames & Moore to Mr. Thomas S. Sanicola, Environmental Engineer, Modine Manufacturing Company. Final Letter Report, Subsurface Investigation, Monitoring Well Installation - Former Hulett Lagoon, Camdenton, Missouri, Dames & Moore Project No. 27397-035-045. October 19, 1998. 7 pages plus attachments.

56. Code of State Regulations, Rules of Department of Natural Resources, Division 20-Clean Water Commission, Chapter 7-Water Quality. Water Quality Standards, 10 CSR 20-7.031, March 30, 1994. 114 Pages.

57. Lyon, Mary, Policy Analyst, Missouri Department of Conservation to Julie Kelsey, Environmental Specialist, DNR. Former Hulett Lagoon. Letter. December 14, 1998. 1 page with enclosure.

58. Wilson, Mark R., Field Supervisor, Fish & Wildlife Service, United State Department of the Interior to Julie B. Kelsey, DNR, DEQ. Letter. December 18, 1998. 4 pages.

59. United States Department of the Interior, Fish and Wildlife Service. Green Bay Terrace, MO and HaHaTonka, MO Quadrangles. National Wetlands Inventory Maps. Aerial Photography April 1984. Maps Dated 1993.

60. Marble/Geocorr Geographic Correspondence Engine. Census Count Information. Internet address: http://www.oseda.missouri.edu/plue/geocorr/.

61. CARES, University of Missouri - Columbia and Missouri Department of Natural Resources, Public Drinking Water Program. Public Drinking Water Map - Windsor Estates Nursing Home, 3069006, 1 Well, 0 Contaminant Sites, 0 Dealerships, Camden County. October, 2, 1996. 2 pages.

62. CARES, University of Missouri - Columbia and Missouri Department of Natural Resources, Public Drinking Water Program. Public Drinking Water Map - Linn Creek, 3010471, 1 Well, 0 Contaminant Sites, 0 Dealerships, Camden County. October, 2, 1996. 2 pages.

63. CARES, University of Missouri - Columbia and Missouri Department of Natural Resources, Public Drinking Water Program. Public Drinking Water Map - Southway Terrace MHP, 3048141, 1 Well, 0 Chemical Sites, 0 Dealerships, Camden County. October, 2, 1996. 2 pages.

APPENDIX A
FIGURES

Figure 1: Site Location Map
Former Hulett Lagoon Site
Camden County, Missouri

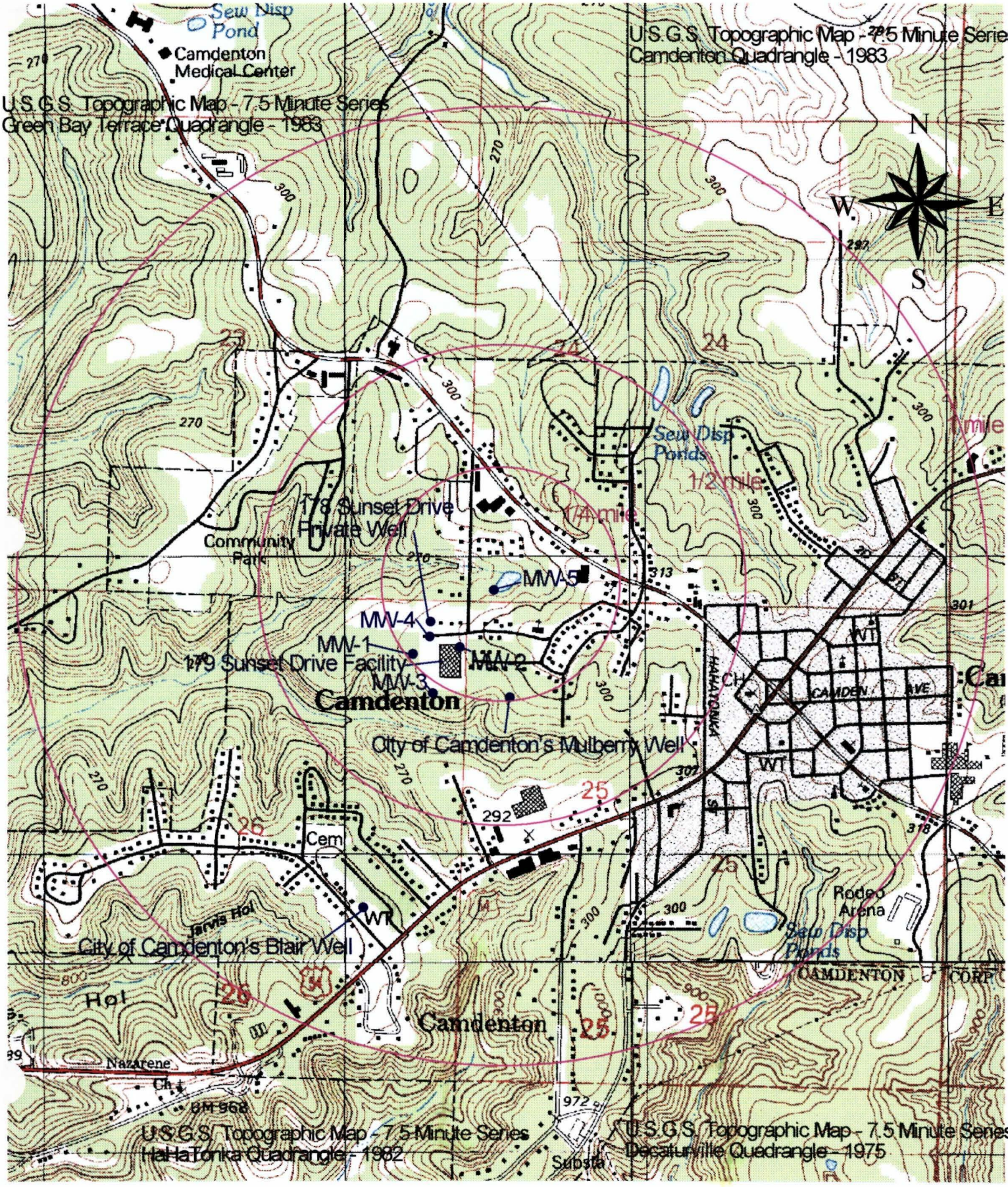


Figure 2: Hulett Lagoon Site Soil Sampling Locations

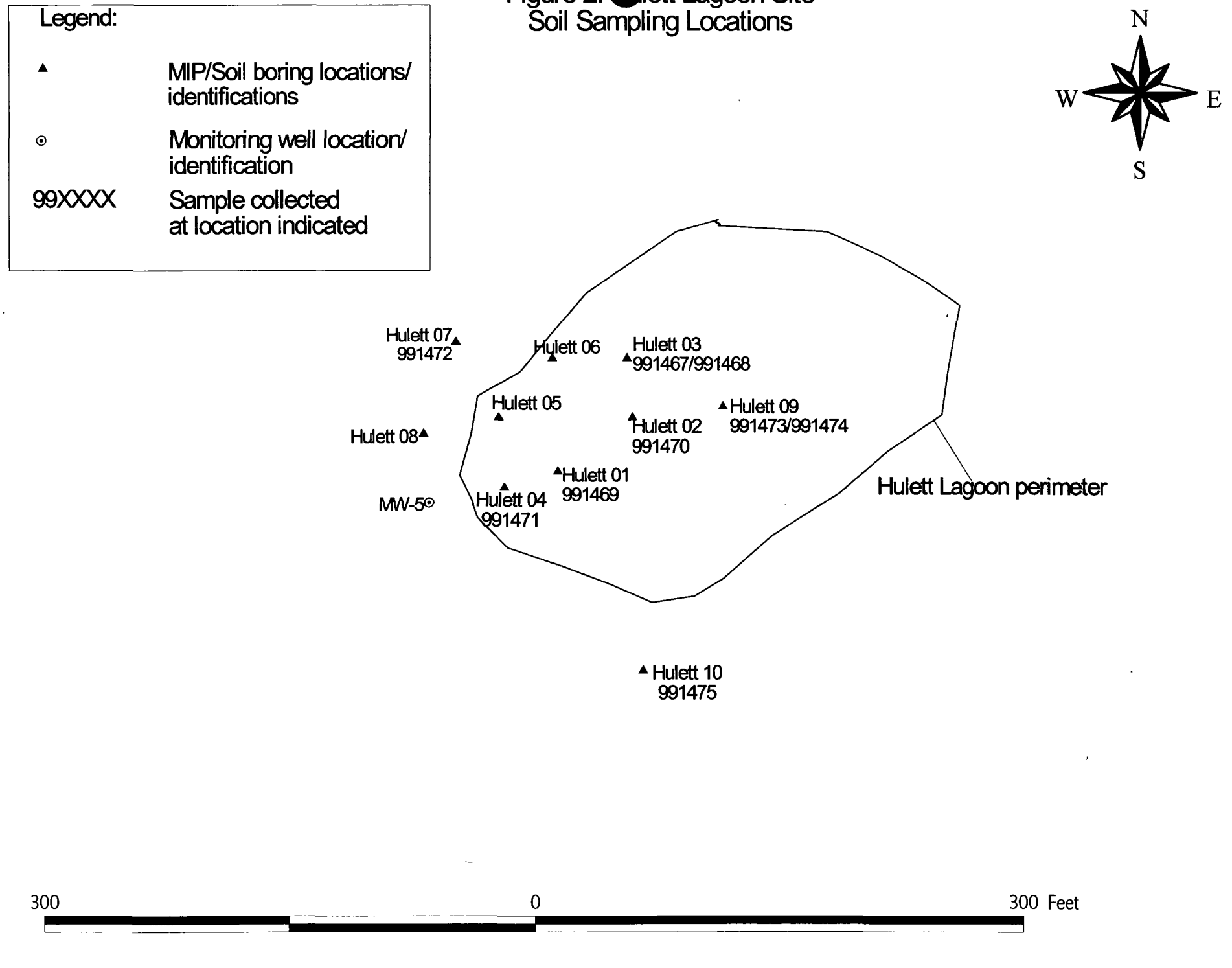


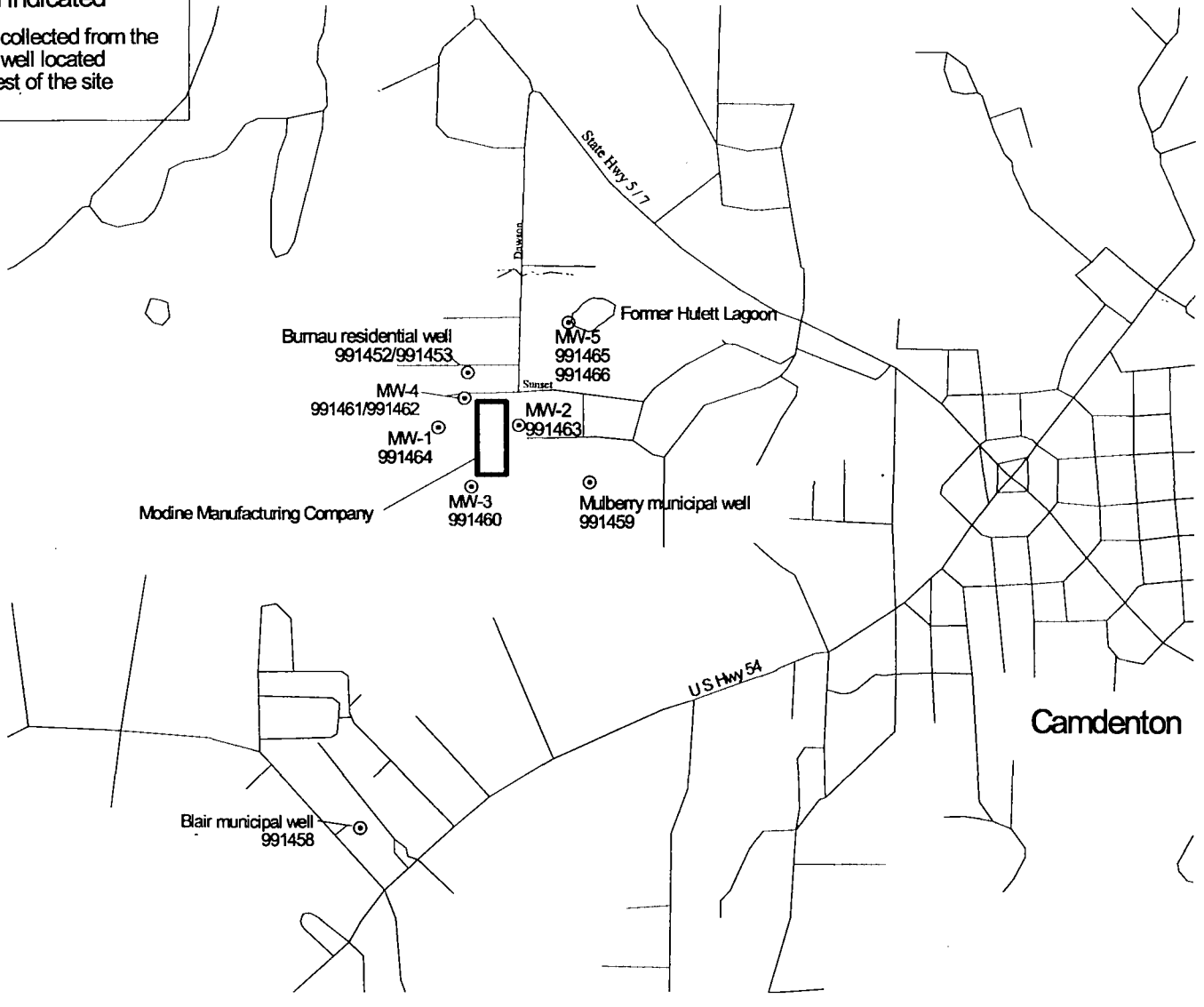
Figure 3: H tt Lagoon Site
Well Sampling Locations

Legend:

⊙ Wells

99XXXX Sample collected at location indicated

Note: Sample 991451 was collected from the Paul Buckwalter residential well located in Normac Estates, southwest of the site and off the map scale.



PHOTOGRAPHS



PHOTO 1

Former Hulett Lagoon Site. Camdenton, MO, Camden County. Photo taken on 10/1/74 by Ronnie Testerman, MDNR, JCRO. View looking northeast at the Hulett lagoon during operation. The northern portion of the lagoon shown in the photo was where influent from domestic sewage entered the lagoon. A small amount of the sludge from the Sundstrand influent, which came in on the south portion of the lagoon can be seen in the foreground of the photo near the wooden catwalk.



PHOTO 2

Former Hulett Lagoon Site. Camdenton, MO, Camden County. Photo taken on 10/1/74 by Ronnie Testerman, MDNR, JCRO. View looking east at the Hulett lagoon during operation. The picture was taken to show the sludge settling around the influent pipe area from Sundstrand.



PHOTO 3

Former Hulett Lagoon Site. Camdenton, MO, Camden County. Photo taken sometime in June or July 1989 by Ronnie Testerman, MDNR, JCRO. View looking northeast at the Hulett lagoon during the beginning of the closure process. The dewatering had begun, but no sludge had been removed.



PHOTO 4

Former Hulett Lagoon Site. Camdenton, MO, Camden County. Photo taken on 12/1/98 by Valerie Wilder, MDNR, Superfund. View looking northeast at the former lagoon. Remnants of the road that was around the lagoon on its berm can be seen in the foreground.



PHOTO 5

Former Hulett Lagoon Site. Camdenton, MO, Camden County. Photo taken on 12/1/98 by Valerie Wilder, MDNR, Superfund. Photo taken looking north at the hillside west of the lagoon. The apartment complex buildings north of the lagoon can be seen through the trees.



PHOTO 6

Former Hulett Lagoon Site. Camdenton, MO, Camden County. Photo taken on 12/1/98 by Valerie Wilder, MDNR, Superfund. Photo taken looking south-southeast. The road surrounding the lagoon on the berm is seen in the right-hand side of the photo. The former lagoon was in the area in the left-hand side of the photo.



PHOTO 7

Former Hulett Lagoon Site. Camdenton, MO, Camden County. Photo taken on 1/21/99 by Valerie Wilder, MDNR, Superfund. Photo taken looking northeast at Geoprobe work during PA/SI sampling.



PHOTO 8

Former Hulett Lagoon Site. Camdenton, MO, Camden County. Photo taken on 1/21/99 by Valerie Wilder, MDNR, Superfund. Photo taken looking north-northeast at Geoprobe work during PA/SI sampling. The apartment complex north of the lagoon can be seen through the trees.

PRESCORE

NPL Characteristics Data Collection Form

Record Information

1. Site Name: Former Hulett Lagoon
   (as entered in CERCLIS)

2. Site CERCLIS Number:

3. Site Reviewer: Valerie H. Wilder

4. Date: 3/26/99

5. Site Location: Camdenton/Camden, MO
   (City/County,State)

6. Congressional District: 4

7. Site Coordinates: Single

   Latitude: 92ø45'17.0" Longitude: 038ø00'41.1"

Site Description

1. Setting: Urban

2. Current Owner: Municipal

3. Current Site Status: Inactive

4. Years of Operation: Inactive Site,from and to dates: 1961-1989

5. How Initially Identified: RCRA Notification

6. Entity Responsible for Waste Generation:

   - Manufacturing
   - Fabr. Struc. Metal Prod.

7. Site Activities/Waste Deposition:

   - Surface Impoundment
   - Discharge to Sewer/Surface Water

NPL Characteristics Data Collection Form

Waste Description

8. Wastes Deposited or Detected Onsite:

   - Solvents

Response Actions

9. Response/Removal Actions:

   - Drinking Water Well Has Been Closed

RCRA Information

10. For All Active Facilities, RCRA Site Status:

    - Not Applicable

Demographic Information

11. Workers Present Onsite: No

12. Distance to Nearest Non-Worker Individual: > 10 Feet - 1/4 Mile

13. Residential Population Within 1 Mile: 2143.0

14. Residential Population Within 4 Miles: 5928.0

Water Use Information

15. Local Drinking Water Supply Source:

    - Ground Water (within 4 mile distance limit)

16. Total Population Served by Local Drinking Water Supply Source: 3010.0

17. Drinking Water Supply System Type for Local Drinking Water Supply Sources:

HRS DOCUMENTATION RECORD

1. Site Name: Former Hulett Lagoon
   (as entered in CERCLIS)

2. Site CERCLIS Number:

3. Site Reviewer: Valerie H. Wilder

4. Date: 3/26/99

5. Site Location: Camdenton/Camden, MO
   (City/County,State)

6. Congressional District: 4

7. Site Coordinates: Single

   Latitude: 92ø45'17.0" Longitude: 038ø00'41.1"

	Score
Ground Water Migration Pathway Score (Sgw)	100.00
Surface Water Migration Pathway Score (Ssw)	0.00
Soil Exposure Pathway Score (Ss)	0.00
Air Migration Pathway Score (Sa)	0.00
Site Score	50.00

NOTE

Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

- Municipal (Services over 25 People)

18. Surface Water Adjacent to/Draining Site:

- Stream

WASTE QUANTITY

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Lagoon

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	Lagoon
b. Source Type	Surface Impoundment
c. Secondary Source Type	N.A.
d. Source Vol.(yd3/gal)	Source Area (ft2) 0.00 / 5445.00
e. Source Volume/Area Value	4.19E+02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	4.19E+02

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Trichloroethylene	> 2	YES	1.2E-01	ppm

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No.	Source ID	Migration Pathways	Vol. or Area Value (2e)	Constituent or Wastestream Value (2f,2h)	Hazardous Waste Qty. Value (2k)
1	Lagoon	GW-SW-SE-A	4.19E+02	0.00E+00	4.19E+02

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant	Values	HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	1.00E+01	100	6
SW: Overland Flow, DW	Tox./Persistence	4.00E+00	100	3
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	2.00E+02	100	10
SW: Overland Flow, Env	Etox./Persis./Bioacc.	2.00E+03	100	18
SW: GW to SW, DW	Tox./Persistence	4.00E+00	100	3
SW: GW to SW, HFC	Tox./Persis./Bioacc.	2.00E+02	100	10
SW: GW to SW, Env	Etox./Persis./Bioacc.	2.00E+03	100	18
Soil Exposure:Resident	Toxicity	0.00E+00	0	0
Soil Exposure: Nearby	Toxicity	0.00E+00	0	0
Air	Toxicity/Mobility	1.00E+01	100	6

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

HRS DOCUMENTATION RECORD

1. Site Name: Former Hulett Lagoon
   (as entered in CERCLIS)

2. Site CERCLIS Number:

3. Site Reviewer: Valerie H. Wilder

4. Date: 3/26/99

5. Site Location: Camdenton/Camden, MO
   (City/County,State)

6. Congressional District: 4

7. Site Coordinates: Single

   Latitude: 92ø45'17.0" Longitude: 038ø00'41.1"

	Score
Ground Water Migration Pathway Score (Sgw)	100.00
Surface Water Migration Pathway Score (Ssw)	0.00
Soil Exposure Pathway Score (Ss)	0.00
Air Migration Pathway Score (Sa)	0.00

Site Score	50.00

NOTE

Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

WASTE QUANTITY

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Lagoon

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	Lagoon
b. Source Type	Surface Impoundment
c. Secondary Source Type	N.A.
d. Source Vol.(yd3/gal)	0.00
Source Area (ft2)	5445.00
e. Source Volume/Area Value	4.19E+02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	4.19E+02

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Trichloroethylene	> 2	YES	1.2E-01	ppm

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No.	Source ID	Migration Pathways	Vol. or Area Value (2e)	Constituent or Wastestream Value (2f,2h)	Hazardous Waste Qty. Value (2k)
1	Lagoon	GW-SW-SE-A	4.19E+02	0.00E+00	4.19E+02

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant Values		HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	1.00E+01	100	6
SW: Overland Flow, DW	Tox./Persistence	4.00E+00	100	3
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	2.00E+02	100	10
SW: Overland Flow, Env	Etox./Persis./Bioacc.	2.00E+03	100	18
SW: GW to SW, DW	Tox./Persistence	4.00E+00	100	3
SW: GW to SW, HFC	Tox./Persis./Bioacc.	2.00E+02	100	10
SW: GW to SW, Env	Etox./Persis./Bioacc.	2.00E+03	100	18
Soil Exposure:Resident	Toxicity	0.00E+00	0	0
Soil Exposure: Nearby	Toxicity	0.00E+00	0	0
Air	Toxicity/Mobility	1.00E+01	100	6

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

HRS DOCUMENTATION RECORD

1. Site Name: Former Hulett Lagoon
   (as entered in CERCLIS)

2. Site CERCLIS Number:

3. Site Reviewer: Valerie H. Wilder

4. Date: 3/26/99

5. Site Location: Camdenton/Camden, MO
   (City/County,State)

6. Congressional District: 4

7. Site Coordinates: Single

   Latitude: 92ø45'17.0" Longitude: 038ø00'41.1"

	Score
Ground Water Migration Pathway Score (Sgw)	100.00
Surface Water Migration Pathway Score (Ssw)	0.00
Soil Exposure Pathway Score (Ss)	0.00
Air Migration Pathway Score (Sa)	0.00
Site Score	50.00

NOTE

Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

WASTE QUANTITY

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Lagoon

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

WASTE QUANTITY

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	Lagoon
b. Source Type	Surface Impoundment
c. Secondary Source Type	N.A.
d. Source Vol.(yd3/gal)	0.00
Source Area (ft2)	5445.00
e. Source Volume/Area Value	4.19E+02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	4.19E+02

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Trichloroethylene	> 2	YES	1.2E-01	ppm

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No.	Source ID	Migration Pathways	Vol. or Area Value (2e)	Constituent or Wastestream Value (2f,2h)	Hazardous Waste Qty. Value (2k)
1	Lagoon	GW-SW-SE-A	4.19E+02	0.00E+00	4.19E+02

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant Values		HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	1.00E+01	100	6
SW: Overland Flow, DW	Tox./Persistence	4.00E+00	100	3
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	2.00E+02	100	10
SW: Overland Flow, Env	Etox./Persis./Bioacc.	2.00E+03	100	18
SW: GW to SW, DW	Tox./Persistence	4.00E+00	100	3
SW: GW to SW, HFC	Tox./Persis./Bioacc.	2.00E+02	100	10
SW: GW to SW, Env	Etox./Persis./Bioacc.	2.00E+03	100	18
Soil Exposure:Resident	Toxicity	0.00E+00	0	0
Soil Exposure: Nearby	Toxicity	0.00E+00	0	0
Air	Toxicity/Mobility	1.00E+01	100	6

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

HRS DOCUMENTATION RECORD

1. Site Name: Former Hulett Lagoon
   (as entered in CERCLIS)

2. Site CERCLIS Number:

3. Site Reviewer: Valerie H. Wilder

4. Date: 3/26/99

5. Site Location: Camdenton/Camden, MO
   (City/County,State)

6. Congressional District: 4

7. Site Coordinates: Single

   Latitude: 92ø45'17.0" Longitude: 038ø00'41.1"

	Score
Ground Water Migration Pathway Score (Sgw)	100.00
Surface Water Migration Pathway Score (Ssw)	0.00
Soil Exposure Pathway Score (Ss)	0.00
Air Migration Pathway Score (Sa)	0.00
Site Score	50.00

NOTE

Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

WASTE QUANTITY

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Lagoon

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	Lagoon
b. Source Type	Surface Impoundment
c. Secondary Source Type	N.A.
d. Source Vol.(yd3/gal)	0.00
Source Area (ft2)	5445.00
e. Source Volume/Area Value	4.19E+02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	4.19E+02

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Trichloroethylene	> 2	YES	1.2E-01	ppm

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No.	Source ID	Migration Pathways	Vol. or Area Value (2e)	Constituent or Wastestream Value (2f,2h)	Hazardous Waste Qty. Value (2k)
1	Lagoon	GW-SW-SE-A	4.19E+02	0.00E+00	4.19E+02

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant Values		HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	1.00E+01	100	6
SW: Overland Flow, DW	Tox./Persistence	4.00E+00	100	3
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	2.00E+02	100	10
SW: Overland Flow, Env	Etox./Persis./Bioacc.	2.00E+03	100	18
SW: GW to SW, DW	Tox./Persistence	4.00E+00	100	3
SW: GW to SW, HFC	Tox./Persis./Bioacc.	2.00E+02	100	10
SW: GW to SW, Env	Etox./Persis./Bioacc.	2.00E+03	100	18
Soil Exposure:Resident	Toxicity	0.00E+00	0	0
Soil Exposure: Nearby	Toxicity	0.00E+00	0	0
Air	Toxicity/Mobility	1.00E+01	100	6

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

DISPOSITION

EPA	POTENTIAL HAZARDOUS WASTE SITE TENTATIVE DISPOSITION	REGION VII	SITE NUMBER

File this form in the regional Hazardous Waste Log File and submit a copy to: U.S. Environmental Protection Agency, Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, D.C. 20460.

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET		
Former Hulett Lagoon	Dawson Road		
C. CITY	D. STATE	E. ZIP CODE	
Camdenton	MO	65020	

II. TENTATIVE DISPOSITION

Indicate the recommended action(s) and agency(ies) that should be involved by marking 'X' in the appropriate boxes.

RECOMMENDATION	Mark 'X'	EPA	STATE	LOCAL	PRIVATE
A. NO ACTION NEEDED - NO HAZARD					
B. INVESTIGATIVE ACTION(S) NEEDED (If yes, complete Section III.)					
C. REMEDIAL ACTION (If yes, complete Section IV.)	X				
D. ENFORCEMENT ACTION (If yes, specify in Part E whether the case will be primarily managed by the EPA or the State and what type of enforcement action is anticipated.)			X		

E. RATIONALE FOR DISPOSITION

Using the Hazard Ranking System (HRS) to evaluate site conditions, the Former Hulett Lagoon site scores above 28.5 and qualifies for proposal to the National Priorities List (NPL). The closing of a public drinking water supply well due to contamination from the site is a significant factor in this site evaluation.

F. INDICATE THE ESTIMATED DATE OF FINAL DISPOSITION (mo,day,yr)	G. IF A CASE DEVELOPMENT PLAN IS NECESSARY, INDICATE THE ESTIMATED DATE ON WHICH THE PLAN WILL DEVELOPED (mo,day,yr)
September 1999	

H. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, & yr.)
Valerie Wilder	(573) 751-8629	March 30, 1999

III. INVESTIGATIVE ACTIVITY NEEDED

A. IDENTIFY ADDITIONAL INFORMATION NEEDED TO ACHIEVE A FINAL DISPOSITION.

The state will attempt to negotiate an agreement for site cleanup with the PRPs. If negotiations are not successful, the site will be recommended for listing on the NPL.

B. PROPOSED INVESTIGATIVE ACTIVITY (Detailed Information)

1. METHOD FOR OBTAINING NEEDED ADDITIONAL INFO.	2. SCHEDULED DATE OF ACTION (mo,day,& yr)	3. TO BE PERFORMED BY (EPA, Contractor, State, Etc.)	4. ESTIMATED MANHOURS	5. REMARKS
a. TYPE OF INSPECTION (1)				
(2)				
b. TYPE OF MONITORING (1)				
(2)				
c. TYPE OF SAMPLING (1)				
(2)				

Continued From Front

(1)				
(2)				
(1) (2)				

C. ELABORATE ON ANY OF THE INFORMATION PROVIDED IN PART B(on front and above)AS NEEDED TO IDENTIFY ADDITIONAL INVESTIGATIVE WORK.

D. ESTIMATE MANHOURS BY ACTION AGENCY

1. ACTION AGENCY	2. TOTAL ESTIMATED MANHOURS FOR INVESTIGATIVE ACTIVITIES	1. ACTION AGENCY	2. TOTAL ESTIMATED MANHOURS FOR INVESTIGATIVE ACTIVITIES
a. EPA		b. STATE	
c. EPA CONTRACTOR		d. OTHER (specify)	

IV. REMEDIAL ACTIONS

A. SHORT TERM/EMERGENCY ACTIONS (On Site and Off-Site): List all emergency actions needed to bring site under immediate control, e.g., restrict access, provide alternate water supply, etc. See instructions for a list of the actions to be used in the space below.

1. ACTION	2. EST. START DATE mo, day, yr	3. EST. END DATE mo, day, yr	4. ACTION AGENCY EPA, State, Private Party	5. ESTIMATED COST	6. SPECIFY 311 OR OTHER ACTION; INDICATE THE MAGNITUDE OF THE WORK REQUIRED.
Excavation of TCE contaminated soil may be necessary				$	
				$	
				$	
				$	
				$	
				$	

B. LONG TERM STRATEGY (On Site and Off-Site): List all long term solutions, e.g., excavation, removal, ground water monitoring wells, etc. See instructions for a list of Key Words for each of the actions to be used in the spaces below.

1. ACTION	2. EST. START DATE mo, day, yr	3. EST. END DATE mo, day, yr	4. ACTION AGENCY EPA, State, Private Party	5. ESTIMATED COST	6.SPECIFY 311 OR OTHER ACTION; INDICATE THE MAGNITUDE OF THE WORK REQUIRED.
Groundwater cleanup of TCE plume				$	
				$	
				$	
				$	
				$	
				$	

C. ESTIMATED MANHOURS AND COST BY ACTION AGENCY

1. ACTION AGENCY	2. TOTAL EST. MAN-HOURS FOR REMEDIAL ACTIVITIES	3. TOTAL EST. COST FOR REMEDIAL ACTIVITIES	1. ACTION AGENCY	2. TOTAL EST. MAN-HOURS FOR REMEDIAL ACTIVITIES	3. TOTAL EST. COST FOR REMEDIAL ACTIVITIES
a. EPA			b. STATE		
c. PRIVATE PARTIES			d. OTHER (specify)		

Former Hulett Lagoon Site
U.S.G.S. Topographic Maps
Reference 3



Camden County, Missouri

Former Hulett Lagoon Site
Combined PA/SI
Reference 47

See Osage Beach Map

Miller Co. PWSD #2

Camden Co. PWSD #1

Camden Co. PWSD #2

Inset Maps

Sources:
Dealerships, chemical sites, U.S.G.S. quadrangle grid, public water supply drainage basins, reservoirs, wellheads, intakes and water districts - Center for Agricultural, Resource and Environmental Systems and Missouri Department of Natural Resources - Public Drinking Water Program.
Highways - Missouri Highway and Transportation Department.
Public Lands Survey System - Missouri Department of Natural Resources - Division of Geology and Land Survey.
Roads, streets, railroads, incorporated areas, villages, streams, lakes and county boundaries - Department of the Interior, U. S. Geological Survey.
Map Produced by CARES, January 1998.

Center for Agricultural, Resource and Environmental Systems University of Missouri - Columbia

Missouri Department of Natural Resources Public Drinking Water Program

Appendix A
Department of Natural Resources
Division of Environmental Quality
Locational Data Collection Sheet

This sheet is used to record required locational data. Attach the ***Optional Locational Data Collection Sheet*** if you need to record additional information.

1. Facility or Site (Name and Address)	Former Hulett Lagoon Site - 0.1 mile NE of intersection of Dawson Rd & Sunset Drive Camdenton, MO 65020						
2. Facility ID, Permit Number or Other Identifier							
3. Data Owner	(1) DEQ/ADM	(2) APCP	(3) ESP	(4) HWP	(5) LRP	(6) PDWP	(7) SWCP
	(8) SWMP	(9) TAP	(10) WPCP	Other:			
4. Locational Data (Leave blank for area features, such as roads, streams or site boundaries.)					Latitude	Longitude	
5. Unit of Measurement	(1) Degrees, Minutes, Seconds	or	(2) Decimal Degrees		38.01143	92.75471	

6. Method of Determining Location (Indicate the method used to determine the latitude and longitude coordinates.)

	Code			Code
Address Matching (Geocoding)			Differential Post Processing	G3
Block/Group	A2		Precise Positioning Service	G4
Digitization	A6		Signal Averaging	G5
Nearest Street Intersection	A4		Real Time Differential Processing	G6
Other Address Matching	AO		**Interpolation**	
Primary Street Name	A5		Aerial Photograph	I2
Street Centerline	A3		Map	I1
Zip Code Centroid (Center)	Z1		Satellite Imagery	I3
Census – 1990			Other Interpolation	IO
Block Centroid (Center)	C1		**Other**	
Block/Group Centroid	C2		Classic Survey	S1
Block/Track Centroid	C3		Land Survey	P1
Other Centroid	CO		Loran C Code	L1
Global Positioning System			Quarter Section Description	S2
Static Mode	G1		Unknown	UN
Kinematic Mode (Dynamic)	G2			

7. Locational Data Accuracy (+/- meters)	38.1 ft			
8. Type of Locational Data Represented	(P) Single Point	(L) Line	(A) Area	
9. Horizontal Datum (Indicate the horizontal datum used to locate the collection site feature.)				
(1) NAD27,	(2) NAD83,	(3) WGS84,	(U) Unknown	Other:

Appendix A
Department of Natural Resources
Division of Environmental Quality
Locational Data Collection Sheet
Continued

10. Collection Site Feature (Mark the feature where the locational data was collected. If needed, use **11. Descriptive Comments** to provide more detail. Provide enough information so someone could return to the collection site feature.)

Collection Site Feature	Code		Collection Site Feature	Code
Bridge	BR		Northeast Corner of the Facility or Site	NE
Building	BL		Northwest Corner of the Facility or Site	NW
Center of Facility or Site	CF		Pile	PL
Described by Descriptive Comment Field	DC		Pipe (Outfall, Intake, Point of Connection, Break, etc.)	OP
Described by Site Name	DS		Rail Road	RR
Equipment Point of Use	EU		Road	RD
Intersection (Road, Pipe, Street, etc.)	IN		Southeast Corner of the Facility or Site	SE
Lagoon or Pond	LS		Southwest Corner of the Facility or Site	SW
Loading Facility or Dock	LD		Stack	AS
Main Access Point (Entrance, Gate, etc.)	MG		Tank, Standpipe, Tower	TK
Main Office	MA		Vent	AV
Missouri Land Survey Monument	MM		Well	WL
Monitoring Station	AM		Unknown	UN
			Other (use Collection Site Descriptive Comments below)	OT

Collection Site Descriptive Comments (If needed, further describe the feature represented by the **Collection Site Feature**. For example, an outfa... the east end of pipe 12; or started at the NW corner, went clockwise around the site, recorded 27 points and ended back at the starting point.)

Reading was collected in the center of the former lagoon

11. Source of Locational Data

Description	Code							
Citizen	CT	SWRO	D3	LRP	N1	EPA Headquarters	HQ
Contractor	CR	KCRO	D4	PDWP	N2	Private Sector	PV
Dun & Bradstreet	DB	NERO	D5	SWCP	N3	Regulated Entity	RE
EPA, Region 7	R7	SLRO	D6	SWMP	N4	Tribe	TR
JCRO	D1	APCP	D7	TAP	N5	Unknown	UN
SERO	D2	ESP	D8	WPCP	N6		
		HWP	D9	DEQ/Adm	N7	Other_____	

12. Source Scale Used to Determine the Latitude and Longitude

Scale	(U) Unknown	

12. Your Name (Please Print)	Valerie Wilder	**Your Phone**	(573) 522-3351	**Date Collected**	1/21/99

Former Hulett Lagoon Site
Combined PA/SI
Reference 5

Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

MEMORANDUM

DATE: February 1, 1999

TO: Former Hulett Lagoon and Camdenton Sludge Disposal Technical Files

FROM: Valerie H. Wilder, Environmental Specialist VW
Site Evaluation Unit, Superfund Section
Hazardous Waste Program

SUBJECT: Site Visits/Sampling Events on
December 1, 16, 1998 and January 21-22, 29, 1999

December 1, 1998, Site Visits

On December 1, 1998, I traveled to Camdenton, Missouri, to review city files on the former Hulett Lagoon. I went to City Hall and spoke with the mayor, Mr. Elmer Meyer. I made copies of the pertinent information on the operation and closure of the Hulett Lagoon. Mr. Tom Emry, Camdenton's Sewer Treatment Plant Manager, stopped by the city hall to answer some of my questions and help interpret maps. After reviewing the files, Mr. Vince Costa, Public Works Director, drove me around and showed me the former Hulett Lagoon, the sludge disposal area out near the airport, and all of the city's drinking water wells.

Directions to the Former Hulett Lagoon site: from the intersection of U.S. Highway 54 and State Route 5 in Camdenton, take State Route 5 northwest for 0.3 of a mile to East Mulberry; take a left onto East Mulberry and the first right onto West Mulberry. When the paved portion of West Mulberry curves to the left, continue straight onto a gravel driveway that leads behind the Ron Hulett Chevrolet-Olds-Buick Jeep/Eagle automobile dealership. Stay to the left on a gravel road that leads down to the lagoon. This road is not regularly maintained; there are several severe ruts caused from washouts.

The lagoon was named and most commonly referred to as the Hulett Lagoon, apparently due to its proximity to the Ron Hulett automobile dealership that is located at 249 N. Highway 5. The former Hulett Lagoon is currently an open field area with grassy vegetation. Remnants of the former berm and the road that surrounded the lagoon are still visible. The lagoon area is generally flat, with surface runoff flowing to the northwest and entering an intermittent drainage that travels to the west. There is a

Recycled Paper

monitoring well, installed by Modine Manufacturing's consultant, located just outside what would have been the southwest edge of the berm of the lagoon. This is known as MW-5. During the closure of the lagoon, apparently, no soil was brought in for the mixing. Some soil from the hillside southeast of the lagoon was scraped in to fill the void.

The lagoon is located in a mixed residential/commercial area of Camdenton. It is bordered on the north by an apartment complex; on the west by a strip of woods about 500 feet wide with Dawson Road on the other side; on the east by woods; and on the south by a strip of woods and then residences. At least two of the apartment buildings in the complex north of the site are within 200 feet of the site, as well as the apartment building and one home south of the site. Access to the lagoon area is not restricted. There is no fencing or gates.

Directions to the Camdenton Sludge Disposal Area site: from the intersection of U.S. Highway 54 and State Route 5 in Camdenton, take State Route 5 southeast for 4.4 miles to County Road 5-120; take a left onto CR 5-120, a gravel road, and travel east. The disposal area is 0.3 of a mile down the road on the north side.

The outline of the stockpiling area is faintly discernable today. The spreader used during the sludge disposal operation was left on-site and is situated approximately 100 yards northwest of the stockpiling area. There are no other structures in the area. Most drainage for the site flows into a low ditch that runs west to east across the southern portion of the site.

The sludge disposal area is bordered on the south by County Road 5-120; on the north by the Camdenton Memorial Airport; on the west by a residence; and on the east by a wooded area. The residence at 3499 RR3 is within 400 feet of the western edge of the site. Access to the site is not restricted. There is no fencing or gates

<u>December 16, 1998, Site Visits</u>
On December 16, 1998, Brian Allen, of the Environmental Services Program, and I traveled to Camdenton to visit the two sites and begin planning for the Combined PA/SI sampling events that were scheduled for January 1999. We met Mr. Larry Coleman, a city employee at the Sewer Treatment Plant, at the sludge disposal site near the airport. Mr. Coleman lives just down County Road 5-120 from the sludge disposal site.
Mr. Coleman told us about the sludge disposal operations that occurred during the closure of the Hulett Lagoon in 1989 and 1990. Since Mr. Coleman lived just down the road, he saw activity at the sludge disposal area almost daily. He said that the sludge was more difficult to spread evenly than the contractors originally anticipated. It didn't

dry out completely and would stick together in clumps. Near the end of the process, he said the contractor took the last several piles of sludge material and simply dumped them into the ditch located about 50 feet north of the circular storage area. It was not spread, mixed or disced.

The following information regarding the sampling events are details that are not documented in the Environmental Services Program Sampling Reports.

January 21, 1999, Sampling Event
Sampling at the Hulett Lagoon commenced on January 21, 1999. That day, Ron Hulett car dealership personnel reported that people often dump trash and junk in the wooded area behind their facility that borders the road leading down to the lagoon. There were also a few pieces of trash in the lagoon area.

January 22, 1999, Sampling Event
Sampling at the Camdenton Sludge Disposal Area site commenced on January 22, 1999. Green sludge material was encountered in borings Hulett 12 and Hulett 19, from the ditch area.

January 29, 1999, Sampling Event
Camden County PWSD #2 personnel reported that Well #2 is the primary well that supplies 99 percent of the water for the district.

VHW:ln

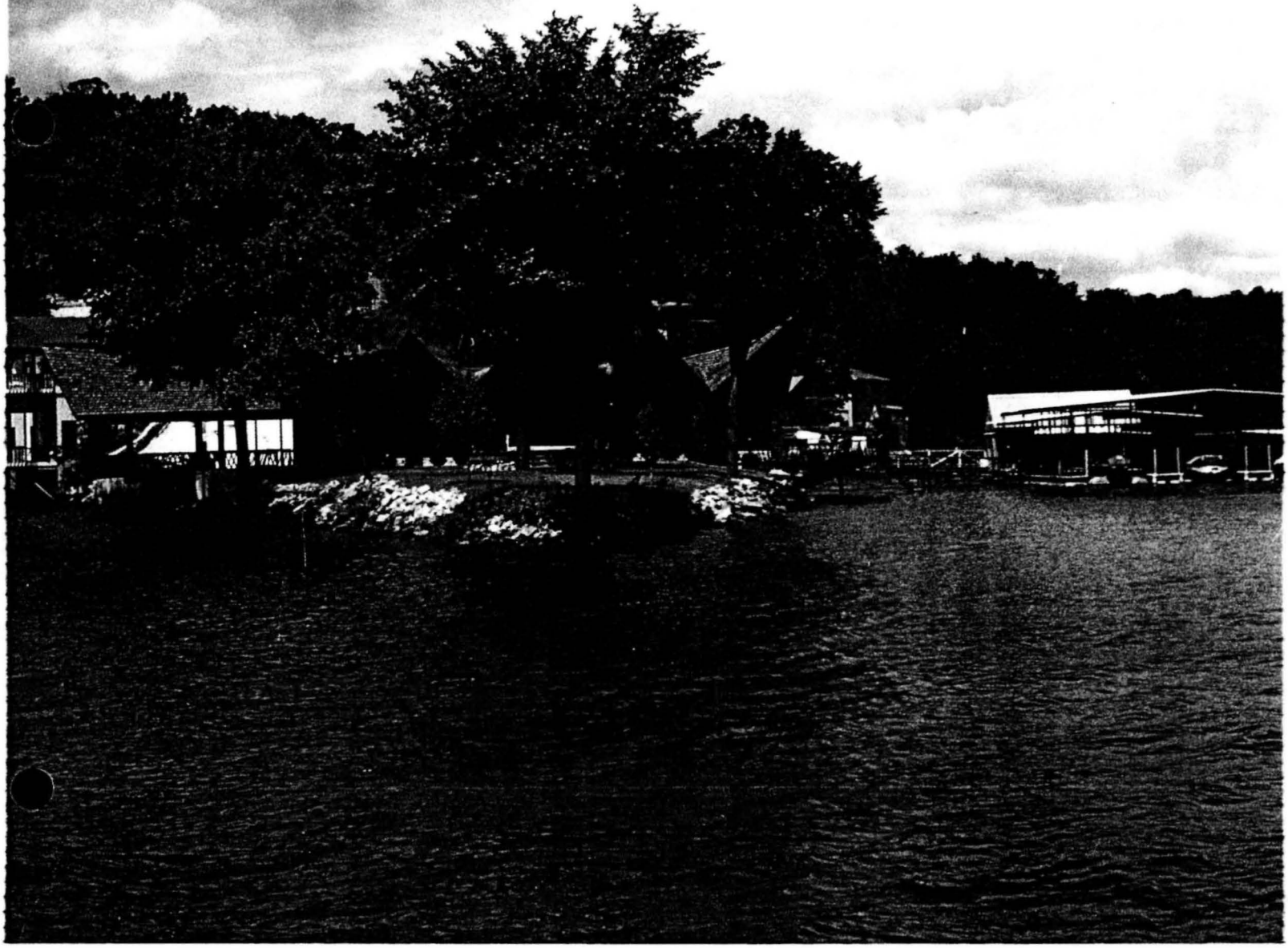
United States Department of Agriculture

In cooperation with Missouri Agricultural Experiment Station

Soil Conservation Service

Soil Survey of Camden County, Missouri

Former Hulett Lagoon Site
Combined PA/SI
Reference 6



Contents

Index to map units iv
Summary of tables v
Foreword vii
General nature of the county 2
How this survey was made 3
Map unit composition 4
General soil map units 5
Soil descriptions 5
Detailed soil map units 13
Soil descriptions 13
Prime farmland 35
Use and management of the soils 37
Crops and pasture 37
Woodland management and productivity 39
Windbreaks and environmental plantings 41
Recreation 42
Wildlife habitat 43
Engineering 44
Soil properties 51
Engineering index properties 51
Physical and chemical properties 52
Soil and water features 53
Classification of the soils 55
Soil series and their morphology 55
Bardley series 55
Cedargap series 56
Clarksville series 56
Doniphan series 57
Gasconade series 58
Gatewood series 58
Gepp series 59
Gunlock series 59
Hartville series 60
Huntington series 61
Kaintuck series 61
Knobby series 62
Lebanon series 62
Moniteau series 62
Niangua series 63
Nolin series 64
Peridge series 64
Plato series 64
Poynor series 65
Razort series 66
Viraton series 66
Formation of the soils 69
Factors of soil formation 69
Geology, physiography, and hydrology 71
References 73
Glossary 75
Tables 83

Issued March 1994

General Nature of the County

This section provides general information about Camden County. It describes climate and history and development.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Camdenton in the period 1951 to 1987. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 35 degrees F and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which occurred at Camdenton on December 25, 1983, is -20 degrees. In summer, the average temperature is 77 degrees and the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred on July 14, 1954, is 115 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 42.32 inches. Of this, 25 inches, or about 59 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 4.67 inches at Camdenton on October 13, 1968. Thunderstorms occur on about 53 days each year.

The average seasonal snowfall is about 19 inches. The greatest snow depth at any one time during the period of record was 16 inches. On the average, 12 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 12 miles per hour, in spring.

Tornadoes and severe thunderstorms occur occasionally, but they are local in extent and of short duration. They may cause damage in scattered areas. The amount of damage varies. Hailstorms sometimes occur in scattered small areas during the warmer part of the year.

History and Development

Osage and Delaware Indians once inhabited the territory now known as Camden County. They built their villages on the terraces along major streams, where they hunted, fished, and raised corn, beans, and pumpkins. In 1827, white settlers began moving into the area after the Indians signed a treaty ceding the land to the U.S. Government *(3)*. For many years after the treaty was signed, the Indians continued to hunt in the area. They camped at various places and hunted deer, bears, turkeys, and raccoons and other small game. They preserved the meat by drying it on scaffolds over fires. After 1846, they no longer returned to the area as a group *(3)*.

Ruben Berry and William Pogue were among the earliest permanent white settlers in the survey area. When they arrived in 1827, they discovered the hull of a keelboat submerged in the Osage River *(3)*. Also, a wooden fur press was found at the mouth of Linn Creek. These artifacts were evidence that French or Spanish explorers, hunters, and trappers had also been in the area. Other settlers later came to the area from Kentucky, Tennessee, and Virginia *(8)*.

Kinderhook County, which is now known as Camden County, was organized in accordance with an act of the Legislature and approved by Governor Thomas Reynolds on January 20, 1841 *(3)*. A site was selected for the county seat on April 12, 1841, in the town of Oregon. The county name was changed to Camden County by an act of the General Assembly of Missouri on February 23, 1843, and the name of the county seat was changed from Oregon to Erie. In 1850, the county seat was moved from Erie to Linn Creek *(3)*. When Linn Creek was inundated by the creation of the Lake of the Ozarks, the county seat was moved to its present location at Camdenton.

Because of the cherty soils, limited transportation facilities, distant markets, and hilly, forested topography, the agricultural enterprises of the area were generally limited to part-time livestock farming. Timber was harvested mostly for railroad ties, fuel, and building material. Other occupations centered around hunting and fishing and the handcrafting of necessities for subsistence. Some row crops were grown in small areas on the stream terraces and flood plains and were used as livestock feed. After World War II, the livestock economy was based on the production of unfinished feeder cattle *(5)*. Higher cattle prices in the 1960's and 1970's made the conversion of timberland to pasture profitable.

Former Hulett Lagoon Site
Combined PA/SI
Reference 7

National Weather Service Office
for State Climatology
P. O. Box 941
Columbia, Missouri 65201

RECEIVED
'93 MAY 5 AM 11 00
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Property of
Please return to →
National Weather Service Office
for State Climatology
P. O. Box 941
Columbia, Missouri 65201

S

ENT OF COMMERCE

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STAT

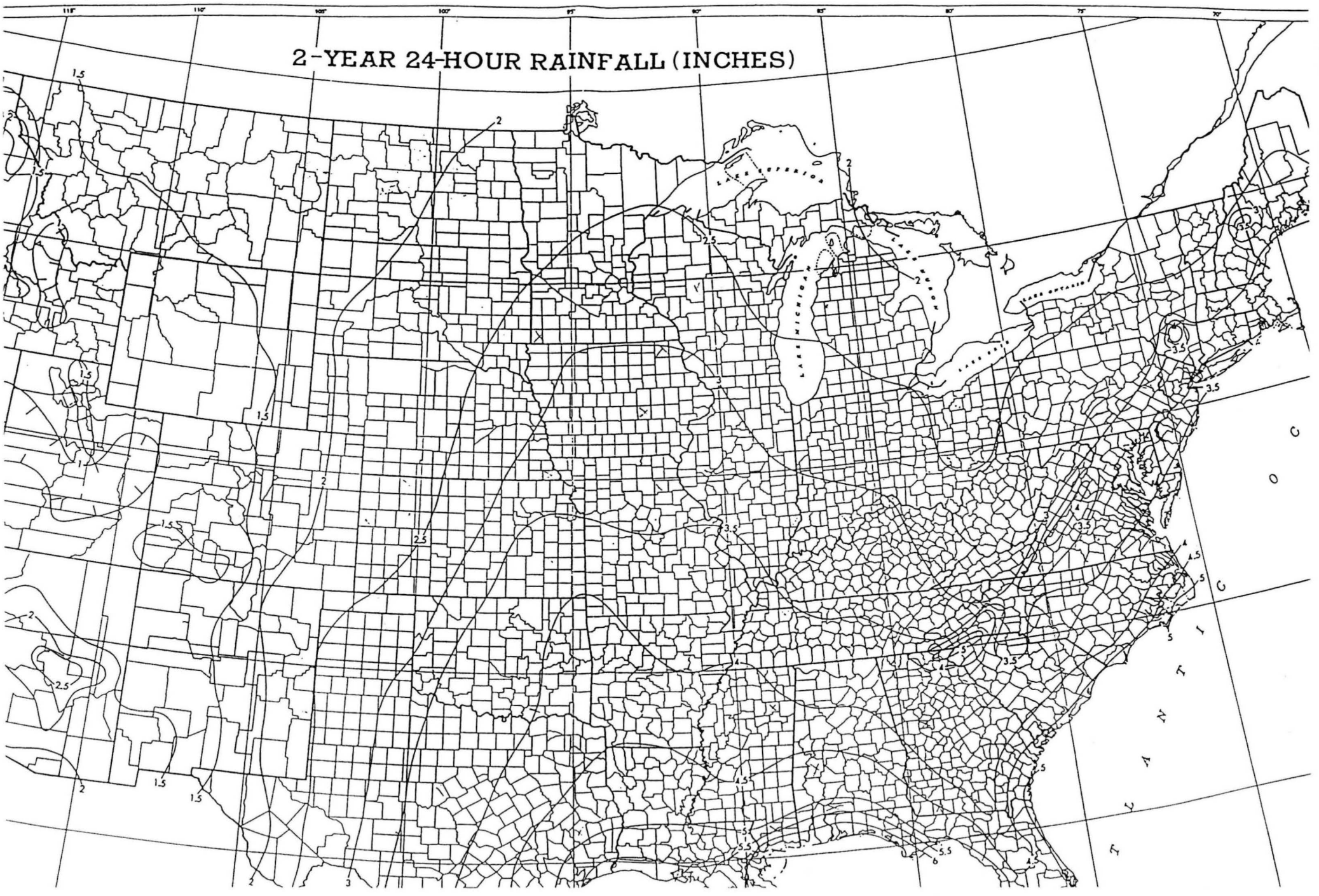
for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

National Weather Service Office
for State Climatology
P. O. Box 941
Columbia, Missouri 65201

1961



National Weath
for State Climat


2-YEAR 24-HOUR RAINFALL (INCHES)
LAKE MICHIGAN
ATLANTIC OCEAN

Former Hulett Lagoon Site
Combined PA/SI
Reference 8

CLIMATIC ATLAS OF THE UNITED STATES



U.S. DEPARTMENT OF COMMERCE

C. R. Smith, Secretary

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION

Robert M. White, Administrator

ENVIRONMENTAL DATA SERVICE

Woodrow C. Jacobs, Director

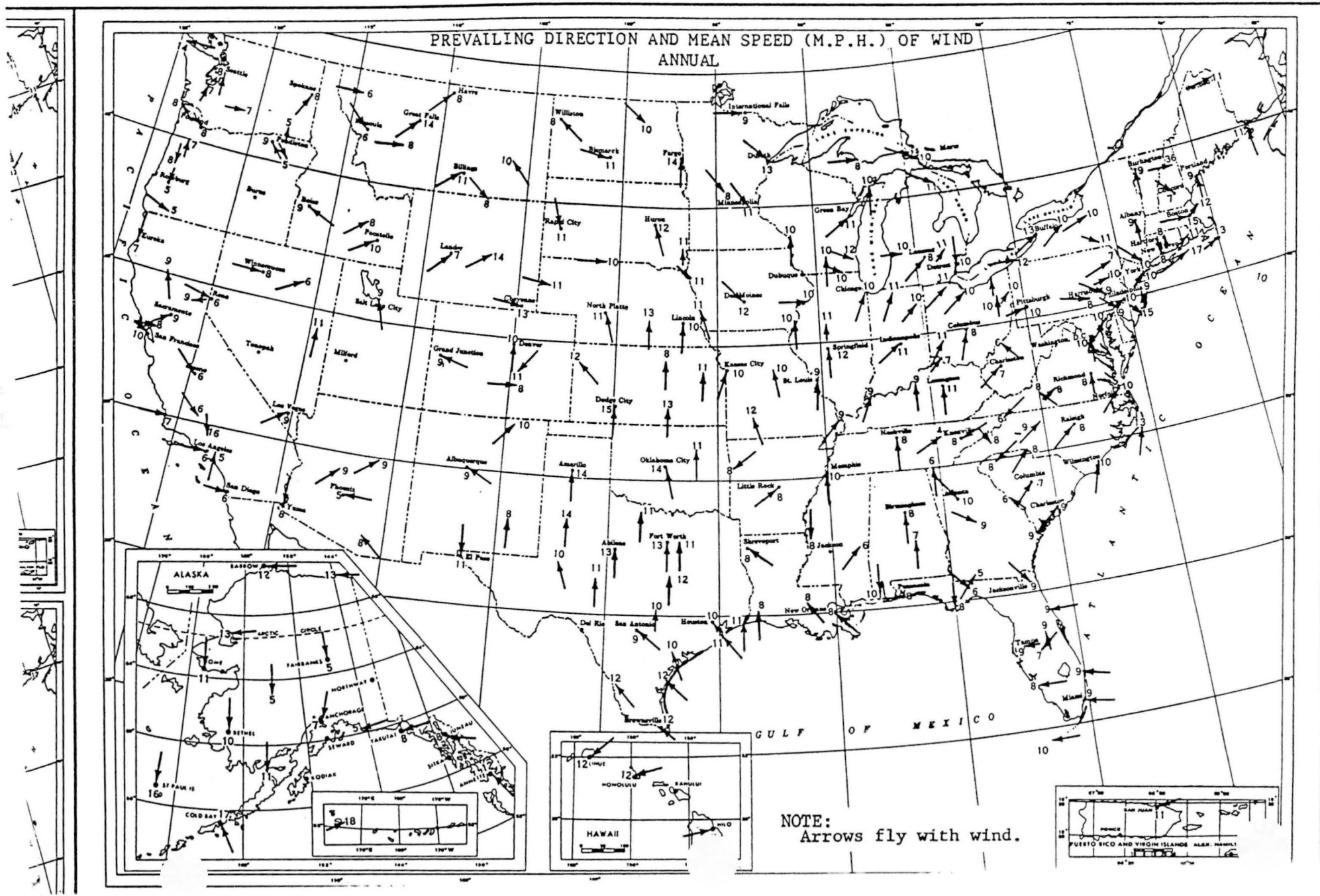
JUNE 1968

REPRINTED BY THE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

1983

MEAN SPEED (m.p.h.), AND FASTEST MILE OF WIND, MONTHLY AND ANNUAL - Contin



Former Hulett Lagoon Site
Combined PA/SI
Reference 9

U.S. ENVIRONMENTAL PROTECTION AGENCY

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

REGIONS VI, VII, VIII

VOLUME I

FINAL
ENVIRONMENTAL PRIORITIES INITIATIVE/ PRELIMINARY ASSESSMENT
MODINE HEAT TRANSFER, INC.
(FORMERLY SUNDSTRAND TUBULAR PRODUCTS)
BOX 636 SUNSET DRIVE
CAMDENTON, CAMDEN COUNTY, MISSOURI
EPA ID NO. MOD062439351

U.S. EPA CONTRACT NO. 68-W8-0122
U.S. EPA WORK ASSIGNMENT NO. 47-7JZZ
U.S. EPA REGION VII

PREPARED BY

JACOBS ENGINEERING GROUP, INC.
10901 WEST 84TH TERRACE, SUITE 210
LENEXA, KANSAS 66214
(913) 492-9218
JACOBS PROJECT NUMBER 12-D247-22

RECEIVED
HAZARDOUS WASTE MANAGEMENT
NATURAL RESOURCES

SEPTEMBER 1992

TABLE OF CONTENTS

SECTION			PAGE
EXECUTIVE SUMMARY			ES-1
1.0	INTRODUCTION		1
	1.1	Objective	1
	1.2	Scope of Work	1
2.0	SITE DESCRIPTION		1
	2.1	Site Location	1
	2.2	Site Features	2
	2.3	Ownership History	2
	2.4	Nature of Operations	2
	2.5	Permit and Regulatory History	5
3.0	ENVIRONMENTAL SETTING		6
	3.1	Area Water Supply	6
	3.2	Potential Surface Water Receptors	6
	3.3	Regional Geology/Hydrogeology	8
	3.4	Site Geology and Hydrogeology	9
	3.5	Area Climatology and Meteorology	10
	3.6	Critical Habitats and Endangered Species	10
	3.7	Population/Census Information	
4.0	VISUAL SITE INSPECTION		10
	4.1	Visual Site Inspection Participants	10
	4.2	Solid Waste Management Units (SWMUs) and Other Areas of Concern (AOCs)	11
REFERENCES			57

FIGURES

Figure 1	Site Location Map
Figure 2	Surface Water Runoff Map
Figure 3	Historical Building Additions
Figure 4	Past and Present SWMU Location Map
Figure 5	Four-Mile Radius Map
Figure 6	15-Mile Surface Water Migration Pathway
Figure 7	Present TCA Wastestream
Figure 8	Historical Vapor Degreaser and Still Location Map

RECEIVED
OCT 1992
HAZARDOUS WASTE PROGRAM
NEW JERSEY DEPARTMENT OF
ENVIRONMENTAL PROTECTION
NATURAL RESOURCES

TABLES

Table 1 SWMU/AOC Identification Summary
Table 2 LAW Environmental Site Assessment Analytical Results Summary
Table 3 Wells Within 4-Mile Radius of Modine Heat Transfer, Inc.

APPENDICES

Appendix A 1980 Part A Application, 1983 Revised Part A Application and RCRA Technical Review
Appendix B 1990 Part A Application
Appendix C Closure Plans
Appendix D Wastewater Discharge Permit City of Camdenton, Missouri
Appendix E Environmental Site Assessment by LAW Environmental, November 1991
Appendix F Well Logs
Appendix G Photodocumentation
Appendix H Analytical Results of Hulett Lagoon Sludge
Appendix I Correspondence from the MDNR to Mayor Webster Regarding Hulett Lagoon Closure Options
Appendix J Closure Plan Analytical Results
Appendix K Present Waste Disposal Method

EXECUTIVE SUMMARY

A Visual Site Inspection (VSI) and a Preliminary Assessment (PA) were conducted by Jacobs Engineering Group Inc. (Jacobs), on behalf of the U.S. Environmental Protection Agency (EPA) Region VII, at Modine Heat Transfer, Inc. (MHT) on March 4, 1992. The Modine facility is on Sunset Drive in Camdenton, Missouri, in Camden County. MHT is a manufacturing facility that produces air conditioning coils and feeder parts from aluminum and copper tubing. The manufacturing process consists of aluminum and copper cutting and brazing, aluminum etching, and, previously, a limited amount of chromium electroplating.

The facility began production in 1967. During the history of the facility, the ownership has changed three times. Previous owners include Dawson Metal Products, Inc. (1967 to 1974) and Sundstrand Tubular Products (1974 to 1990). MHT is the current owner/operator. Various types of hazardous waste are generated during the manufacturing process including: 1,1,1-trichloroethane (TCA); paint waste; wastewater pretreatment sludge; solvents; and waste oil. Non-hazardous wastes generated by the facility include: paper; cardboard; scrap metal; and general refuse. All wastes are either drummed in 55-gallon barrels, stored in high-capacity storage tanks, shipped to recycling centers, processed by the pretreatment wastewater unit, and released to the city publically-owned treatment works (POTW), or stored for reclamation or disposal by contracted services. From 1967 until 1986, wastes were disposed through mudpits to the Hulett Lagoon, which was owned by the city of Camdenton. In 1986, a pretreatment wastewater system was placed on-line, which remains in service.

Thirty-four Solid Waste Management Units (SWMUs) and four Areas of Concern (AOCs) have been identified at this facility. The SWMUs and AOCs identified are:

SWMU Number 1	Hulett Lagoon
SWMU Number 2	Mudpits
SWMU Number 3	Pretreatment Wastewater System/Filter Press
SWMU Number 4	Tank and Drum Storage Area Number 1
SWMU Number 5	Drum Storage Area Number 2
SWMU Number 6	Waste FIN Oil Storage Tank Number 1
SWMU Number 7	TCA Waste Storage Tank Number 6
SWMU Number 8	Copper Cleaning Line
SWMU Number 9	Copper Cleaning Line Scrubber
SWMU Number 10	Aluminum Cleaning Line
SWMU Number 11	Large Aluminum Brazing Furnace
SWMU Number 12	Large Aluminum Brazing Furnace Scrubber
SWMU Number 13	Small Aluminum Brazing Furnace
SWMU Number 14	Small Aluminum Brazing Furnace Scrubber

SWMU Number 15	Chrome Cleaning Line
SWMU Number 16	Chrome Cleaning Line Scrubber
SWMU Number 17	Aqueous Cleaning Bath
SWMU Number 18	Vapor Degreaser and Still M184
SWMU Number 19	Vapor Degreaser and Still M185 (Former)
SWMU Number 20	Vapor Degreaser and Still M185 (New-Location 1)
SWMU Number 21	Vapor Degreaser and Still M185 (New-Location 2)
SWMU Number 22	Vapor Degreaser and Still M487 (Former)
SWMU Number 23	Vapor Degreaser and Still M487 (New)
SWMU Number 24	Vapor Degreaser and Still M460 (Former-Location 1)
SWMU Number 25	Vapor Degreaser and Still M460 (Former-Location 2)
SWMU Number 26	Vapor Degreaser and Still M567
SWMU Number 27	Vapor Degreaser and Still M394 (Former-Location 1)
SWMU Number 28	Vapor Degreaser and Still M394 (Former-Location 2)
SWMU Number 29	Vapor Degreaser and Still M394 (Former-Location 3)
SWMU Number 30	Two 2,000-Gallon Storage Tanks
SWMU Number 31	Drum Storage Area Number 3
SWMU Number 32	Pretreatment/Drum Storage Area
SWMU Number 33	Non-Hazardous Waste Receptacle
SWMU Number 34	Scrap Metal Storage Bins
SWMU Number 35	Fire Training Area
AOC A	Raw Materials Storage Area
AOC B	Pallet Storage Area
AOC C	Tool Crib/Maintenance Area
AOC D	Paintline

The above-listed SWMUs remain active with the exception of SWMU Numbers 1, 2, 4, 5, 11, 12, 13, 15, 16, 19, 20, 22, 24, 25, 27, 28, 29, and 31. These SWMUs are no longer in operation and, except for a portion of SWMU Number 2, have been dismantled or removed from the site.

Two potential release areas were identified in 1991 by LAW Environmental during an Environmental Site Assessment conducted on behalf of the MHT facility. The areas investigated include two former drum storage areas (SWMU Numbers 4 and 31) where soil borings revealed elevated levels of hazardous substances. LAW recommended further investigation to determine the nature and extent of the contamination.

The facility holds interim status as a treatment, storage, and disposal (TSD) facility. In March 1992, MHT submitted a Revised Closure Plan to the Missouri Department of Natural Resources (MDNR) in order to terminate its interim status.

The gray bat (myotis griesecens) is the only federal and state-threatened species known to exist within a 15-mile downstream distance from the facility. No critical habitats or sensitive environments exist at the facility or are within one-half mile. No aquatic critical habitats or sensitive environments exist within 15-miles downstream from the facility.

SWMU NUMBER: 1

SWMU NAME: Hulett Lagoon

SWMU DESCRIPTION: The Hulett Lagoon is 1/4 mile northeast of the Modine facility on the east side of Dawson Road. The lagoon is owned by the City of Camdenton, Missouri. The lagoon was constructed in 1961 under the State of Missouri Grants Program and is approximately one acre in size. The lagoon was constructed of clay, and its berms were approximately 25 feet wide and 15 feet high. The location of the Hulett Lagoon is depicted on Figure 1 as SWMU Number 1 (Reference 15).

Modine began utilizing the lagoon in 1967. The facility would release its untreated wastewater and stormwater into the lagoon through a series of "mudpits" (SWMU Number 2) via a storm sewer.

DATES OF OPERATION: The Hulett lagoon was in operation from 1961 until its closure in late 1989. The Modine facility utilized the lagoon for its waste disposal system from 1967 through 1986, when the facility installed its pretreatment wastewater system.

In 1988, the City of Camdenton began RCRA closure of the Hulett Lagoon. The sludge was sampled for metals, and analytical results are presented in Appendix H. High levels of chromium, lead, and nickel were detected. City officials were given several options by MDNR to consider in completing the abandonment and closure of the Lagoon within the MDNR Water Resources Program (Appendix I). The option chosen and implemented by the city was the subsurface application of sludge from the lagoon by spreading it in place and discing and plowing it into the subsurface soils. The berms were then turned in and mixed to a 1:1 ratio with surrounding soils. The sludge was then taken by truck to the municipal airport and land-applied at a field near the runway in accordance with the terms of the MDNR correspondence contained in Appendix I. No confirmation samples were collected following removal of the sludge. The city is in the process of leveling the site of the former lagoon and opening it up for a neighborhood park (Reference 15). It should be mentioned that using this area for purposes other than sewage sludge disposal is contrary to the terms agreed upon between MDNR and the City of Camdenton.

WASTES MANAGED: Wastes managed by the Hulett Lagoon included all wastewater, stormwater, and aluminum and copper cleaning line wastes from the MHT facility. Information regarding the type and quantity of waste distributed and accumulated at the Hulett Lagoon is not available. Potential wastes handled include: F001, F006, D001, and D098.

RELEASE CONTROLS: Release controls at the Hulett Lagoon include clay lining and berms.

RELEASE HISTORY: The Hulett Lagoon was the site for release of all untreated process wastes from the MHT facility. As stated previously, elevated levels of chromium, lead, and nickel were detected in the sludge analysis recorded during closure of the lagoon.

MIGRATION PATHWAYS: The primary migration pathways for contaminants in order of decreasing likelihood would be soil, surface water, and groundwater.

PHOTOGRAPH NO.: 1 and 2

SWMU NUMBER: 2

SWMU NAME: Mudpits

SWMU DESCRIPTION: Four "mudpits" (sumps) were located approximately 10 feet west of the manufacturing building. The mudpits were approximately 15 feet apart, running from the scrap-metal bins to the pretreatment/drum storage area (SWMU Number 32). Each mudpit consisted of a 4-foot by 4-foot cement sump approximately 4 feet in depth. Two of the four mudpits no longer exist and are beneath the pretreatment/drum storage area. The location of the mudpits is depicted on Figure 3 as SWMU Number 2.

The mudpits were connected by a 6-inch steel line that delivered stormwater, boiler water, chrome, copper, and aluminum cleaning line waste from the manufacturing process. Each sump received the previous sump's wastes until wastewater was discharged into the sewer. The southern-most mudpit was an open pit which collected boiler water and stormwater. The second mudpit directly collected aluminum cleaning line waste and stormwater from the first. The third and fourth mudpits collected copper cleaning line waste in addition to the aluminum cleaning line waste and the stormwater runoff. These four mudpits collectively discharged wastewater into a storm sewer line which led directly to the Hulett Lagoon (SWMU Number 1)(Reference 12).

DATES OF OPERATION: The mudpits were in operation from 1967 to 1986. Two of the four mudpits were removed to construct the pretreatment/drum storage area. The two remaining mudpits, which are no longer in service, are covered by plywood sheets.

WASTES MANAGED: Wastes managed by the mudpits included wastewater, stormwater, and aluminum and copper cleaning line wastes. Information on the type and quantity of waste accumulated and distributed through the mudpits is unavailable. Potential wastes handled by these units include: F001, F006, D001, and D098.

RELEASE CONTROLS: Release controls for the mudpits included the 4-foot by 4-foot concrete sump walls which were 6 inches in width. The sumps were covered on the surface by a wooden ply-board which prevented precipitation from entering the sumps. The southern-most sump was not covered, however, and did receive run-on from the manufacturing building. No other release controls or secondary containment were utilized at this SWMU.

RELEASE HISTORY: There is no record or documentation of any release of materials associated with the mudpits during the operation lifetime.

MIGRATION PATHWAYS: If a release were to occur from the mudpits, the primary migration pathways would be soil, surface water, groundwater, and air, in decreasing order of likelihood.

PHOTOGRAPH NO.: 3

Former Hulett Lagoon Site
Combined PA/SI
Reference 10

MISSOURI WATER QUALITY BASIN PLANS

VOLUME 4

Osage and Gasconade Rivers (Including ake of the Ozarks, Truman Reservoir, South irand, Little Osage, Marmaton, Marais des ygnes, Sac and Pomme de Terre Rivers, ebo Creek and Big Piney River).

TABLE OF CONTENTS

	Page
Introduction	1
BASIN 30 Lower Osage River	3
BASIN 31. Lake of the Ozarks	10
BASIN 32. Dry Auglaize and Wet Glaize Creeks	21
BASIN 33. Niangua River	26
BASIN 34. Truman Reservoir	31
BASIN 35 Northwest Tributaries to Truman Reservoir (South Grand River, Big Creek)	38
BASIN 36. Tebo Creek	46
BASIN 37. Western Tributaries to Truman Reservoir (Marais des Cygnes, Marmaton, Little Osage Rivers)	51
BASIN 38 Sac River Below Stockton Dam	61
BASIN 39 Stockton Reservoir	66
BASIN 40. Little Sac River	70
BASIN 41. Sac River Above Stockton Reservoir	75
BASIN 42. Pomme de Terre River below Dam	81
BASIN 43. Pomme de Terre Reservoir	83
BASIN 44. Pomme de Terre River Above Reservoir	85
BASIN 45 Gasconade River Except Big Piney River	89
BASIN 46 Big Piney River	98
BIBLIOGRAPHY	102

INTRODUCTION

Missouri's Water Quality Basin Plans are a guide to managing the quality of the aquatic resources of the state In their simplest form they are a set of water quality problems and a corresponding set of actions which will correct these problems

There are only a few basic kinds of water quality problems such as organic enrichment from domestic and industrial discharges and from livestock, discharges of toxic materials which come from domestic and industrial sources, acid runoff or seepage from coal mined lands, highly mineralized water (a naturally occurring problem in certain groundwaters), and lastly, sediment from erosion of soil or mine tailings

At any given location, the apparent simplicity of our water problems is complicated by such specifics as the volume of the pollutant discharge and its variability, the concentration of specific pollutants and their variability, and the volume of the receiving stream and its variability The proximity of other pollutant sources or areas of water use (water based recreation areas, drinking water withdrawal points) tends to make a problem in a particular location, if not unique, at least discernably more or less severe than a similar problem in another location These plans should note which problems are of the highest priority

In recognizing the need to write management plans for specific problem areas, this document divides the state into eight major drainages (corresponding to the eight volumes of this document). It then divides the eight drainages into 77 basins and presents a specific list of water quality problem areas and recommended solutions for each basin

The first part of each basin plan is a description of the basin in terms of geography, geology, hydrology, and aquatic use potential This description is followed by a detailed inventory of all known actual or potential sources of water pollutants The final part of the basin plan is a discussion of water quality problems and how they affect our water quality goals for the basin, and the basin plan itself in the form of tables listing specific water quality problems, their sources, and recommended solutions

Each basin plan consists of the following sections

BASIN NUMBER

BASIN NAME

DRAINAGE AREA

COUNTIES: (Included partially or wholly within the basin)

BASIN DESCRIPTION: Geographic limits of the basin and major streams within the basin

LAND USE: Percentage of basin in forest, pasture or cropland urban lands, or mined lands

CLASSIFIED STREAMS: Missouri's water quality standards (CSR 1981) recognize three kinds of surface waters

P1 Reservoirs, Lakes, Sloughs, Backwaters, and other impounded waters

P Permanently flowing streams

C Streams which may cease flow during prolonged dry weather but maintain permanent pools which act as refuges for aquatic life and provide drinking water for livestock and wildlife

HYDROGEOLOGY: A description of the surficial and underlying geologic strata and how they influence water movement within the basin

GEOLOGIC CROSS SECTION DIAGRAM: This diagram shows the geologic strata from the surface to a depth of at least 500 feet, indicates how deeply stream valleys incise these strata, and indicates how much water is discharged by known springs from each of these strata

STREAM FLOW: Stream flow data are taken from USGS records There are several flow statistics or descriptions used in water management Those included in the stream flow table which may require explanation are

Mean flow The arithmetic average flow That is, the sum of all flows divided by the number of flow measurements.

Median flow The flow which is exceeded exactly 50% of the time.

7 day-Q10 flow The lowest average flow for a seven consecutive day period with a recurrence interval of ten years.

7 day-Q2 flow. The lowest average flow for a seven consecutive day period with a recurrence interval of two years

STREAM USES (CSR, 1981): Missouri recognizes nine beneficial uses of the state's waters. Based on numerous public meetings, user surveys and other studies, each classified stream in the state (Class P1 P or C), or segment thereof, has a list of uses appropriate to that stream The Mississippi and Missouri Rivers and Shoal Creek (Jasper and Newton Counties) have the most recognized uses (seven), a few streams which are badly polluted, like Turkey Creek (Jasper County), have none.

The nine beneficial uses are: (1) Irrigation of croplands. (2) Livestock and wildlife watering, (3) Protection of aquatic life and fishing, (4) Coldwater sport fishery (trout fishing), (5) Whole body contact recreation (swimming, water skiing, skin diving), (6) Drinking water supply, (7) Industrial process and cooling water; (8) Commercial fishing, (9) Limited water contact recreation (canoeing, boating)

LAKE USES (CSR, 1981): All classified lakes and reservoirs (P1) are identified and their beneficial uses listed A list of all lakes and reservoirs (including unclassified ones) greater than 50 acres is given, showing location, size, and major use(s)

This section also gives the total number of lakes and reservoirs inventoried by the dam safety program (generally those reservoirs greater than 2 acres in area), the range in size, and the mean and median lake area

WITHDRAWALS: This section indicates whether or not there are public drinking water withdrawals from surface waters in this basin and which streams or reservoirs these withdrawals are taken from

POPULATION: 1980 population data are given as is the population change from 1970 to 1980 This section also makes projections of future population trends

WATER QUALITY DATA: Important sources of water quality information for the basin are listed Other information referenced within the basin plans but not listed here appear in a bibliography at the end of each of the eight volumes

ENDANGERED SPECIES: Any animal species which should be noted by an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) are included Either an EIS or a FONSI is required for any construction activity that uses federal funds

BASIN MAPS: There are two basin maps The first shows the classified stream network, those unclassified streams having an NPDES or Non-NPDES facility, and the unclassified headwaters of classified streams It also shows stream names, county lines, the location and sizes of all NPDES discharges and other potentially significant sources of water pollution. Solid stream lines are classified "P", dashed stream lines are classified "C", and dot-dashed stream lines are unclassified The letter-number code is explained in Table 1

The second map shows the drainage network and the location of towns, petroleum and ammonia pipelines, and active railroads. It also shows losing stream segments as heavy dotted lines (Where there is contradictory information on stream names, the names appearing on USGS 7 5- or 15-minute topographic maps are used)

OTHER MAPS: A few basins have additional maps which give more detailed information on location, size, and condition of lead-zinc and barite tailings areas.

LOW FLOW DIAGRAM: This diagram is a schematic map of the basin which shows all classified streams and all potentially significant discharges

All streams are shown as vertical lines and are drawn to scale for actual stream length Solid lines are Class P streams, dashed lines are Class C streams, and alternating dots and dashes are unclassified streams The width of the vertical lines of Class P streams are drawn to scale for volume of flow at the 7 day-Q10

Horizontal lines are not stream segments, but they mark the location of inflow of discharges or tributaries to a stream Volume of tributary inflows or discharges are also estimated flows for the 7 day-Q10, and these numbers follow the name of the tributary or the discharge on the horizontal line Numbers appearing on the vertical stream lines are calculated 7 day-Q10 values

Stream segments known or believed to be affected by discharges are indicated

Lakes and reservoirs are drawn to their approximate shape The length of the impoundment can be found by scaling the distance along the center line of the impoundment The outlines of reservoirs have two lines The inner line indicates the boundaries of the normal use pool and the outer line the flood pool.

INVENTORY TABLE: This table lists all NPDES permitted discharges in the basin, other potential waste or wastewater sources, and surface withdrawals for public drinking water supplies "S" "T" "R" refers to "Section", "Township", and "Range" If there is no direction after the range, it is assumed to be "West".

WATER QUALITY PROBLEMS, POINT SOURCE: Point source problems have been identified through physical and chemical water quality monitoring by the Department of Natural Resources and several other organizations, and by visual surveys and surveys of the benthic plant and animal communities of streams These latter surveys are conducted primarily by the Departments of Conservation and Natural Resources

WATER QUALITY PROBLEMS, NON-POINT SOURCE: Non-point source water quality problems have been quantified, where possible, by Section 208 planning activities which took place between 1978 and 1982 Soil erosion and sediment delivery studies were made by SCS and USGS Lead-zinc mining related impacts were studied by USGS, the Departments of Conservation and Natural Resources, and the University of Missouri, Rolla Inventories of lead-zinc, coal, and barite mining areas and their reclamation states were made by the Department of Natural Resources

BENEFICIAL USE ATTAINMENT: This section evaluates existing in-stream water quality and whether or not it meets the standards required for the beneficial uses identified in that basin

SUMMARY TABLE OF POINT SOURCE PROBLEMS AND MANAGEMENT NEEDS: All municipal facilities are listed as are any non-municipal NPDES permitted discharges that are, or are suspected of causing water quality problems in receiving streams. Length of affected segment, classification of affected segment (permanent flow (P), permanent pools and intermittant flow (C), and completely dry stream bed during dry periods (U)), a recent permit compliance record and recommended DNR action to alleviate the problem are all included in this table The severity of impacts were described as affected (aff) or polluted (poll) A polluted length had a partially or totally impaired use An affected length had a noticeable affect but uses were not impaired

SUMMARY TABLE OF OTHER PROBLEMS AND MANAGEMENT NEEDS: This table lists all known or suspected water quality problems arising from sources that do not hold NPDES permits Soil erosion, stream channelization, drainage from abandoned mined lands or animal confinement areas are common non-NPDES source problems The problem, the stream segment affected, cause, and the recommended DNR action to alleviate the problem are included in the table

Volume 4 contains Basins 30-46 which include all streams in the Osage and Gasconade River System

The streams of the western part of the Osage River basin rise in Kansas or extreme western Missouri and flow through a flat prairie land of row crops and pastures Although most of the area has not been glaciated, it is underlain by Pennsylvanian rock which retards downward movement of water to the groundwater Thus most rainfall runs off the surface of the land rather than soaking in. There are short periods of high stream flow during and immediately after rains, and streams have low or no flow during dry periods Groundwaters are recharged very slowly, groundwater movement is slow, and wells generally yield small amounts of water which are usually very mineralized

The streams further east are in unglaciated terrain underlain by older limestones and dolomites There is more movement of water to the subsurface, thus baseflows of streams are greater and wells usually have good yields of potable water

The Osage system contains four large reservoirs which are a major focal point for fishing, camping, boating, and swimming in the state The Gasconade River is totally unimpounded and is an excellent river for canoeing and float fishing for smallmouth bass. The four large reservoirs have reduced stream habitat in the basin but have replaced it with lake habitat Thus the potential fishery has been increased but the presence and operation of the reservoirs, particularly Truman Reservoir, threatens to reduce this fishery

Except in western Missouri where soil erosion causes instream turbidity and some loss of aquatic habitat, nonpoint pollution sources are not significant factors in aquatic habitat degradation

TABLE 31-1—LAKE OF THE OZARKS

NPDES Inventory

	FACILITY	Location S T R	Receiving Stream	County	Facility Type or Waste Char.	Design P.E.	Flow (MGD)	NPDES Permit No.
Municipal Discharges								
W1	Camdenton Lgn #1 CP White	NW SE 35,38,17	Racetrack Hollow	Camden	2-c lagoon	1,765	176	0048569
W2	Camdenton Lgn #2 Cedar Str	NW SE 25,38,17	Trib to Lake of the Ozarks	Camden	2-c lagoon	742	074	0048585
W3	Camdenton Lgn #3 Factory Rd	SW SW 24,38,17	Trib to Jarvis Hollow	Camden	1-c lagoon	265	027	0048577
W4	Camdenton Lgn #5 Clint Ave/Wilkerson Ave	Ctr E W 24,38,17	Possum Hollow Ck	Camden	2-c lagoon	716	071	0048607
W5	Camdenton Lgn. #6 Parish Subd	Ctr. N S 19,38,16	Trib. to S Fk Linn Ck	Camden	1-c lagoon	850	085	0048593
W6	Cole Camp STP	NE SE 34,43,21	Cole Camp Creek	Benton	Oxidation Ditch	2,225	222	0056626
W7	Lincoln Lgn (E)	NE NW 26,42,22	Trib to Cole Camp Creek	Benton	1-c lagoon	870	087	0044199
W8	Linn Creek STP	SE SW 8,38,16	Linn Creek	Camden	1-c lagoon	45	004	0054712
W9	Warsaw STP	NE SE 16,40,22	Lake of the Ozarks	Benton	3-c lagoon	2,200	220	0049239
Non-Municipal Discharges								
W17	Skyline Motel	NW 6,39,15	Lake of the Ozarks	Camden	1-c lagoon	35	001	0083470
W18	Shoreline Motel	SW 19,40,15	Lake of the Ozarks	Miller	Septic tank/s f	35	001	0083488
W19	Alhonna Resort	SE NE 25,40,17	Lake of the Ozarks	Camden	septic tank/s.f	35	002	0083399
W20	Gold Nugget Junction	NE 28,39,16	Trib to Lake Ozarks	Camden	1-c lagoon	32	002	0083313
W21	Camdenton Med Center	SW 14,38,17	Possum Hollow	Camden	1-c lagoon (Hg, Ba, Ag limits)	73	005	0083305
W22								
W23	Point Breeze Resort	NE 11,39,16	Lake of the Ozarks	Camden	septic tank/s f	57	003	0083267
W24	Osage Beach Elem School	S 6,39,15	Trib to Lake of the Ozarks	Camden	septic tank/s f	165	002	0082988
W25								
W26	Lodge of the Four Seasons	SW SW 27,40,16	Lake of the Ozarks	Camden	activ sludge	3,268	376	0082171
W27	Tan-Tar-A Resort	SE SE 7,39,16	Lake of the Ozarks	Camden	Rotating Bio-Media	1,700	170	0081937
W28	Tan-Tar-A Estates	SW SE 7,39,16	Lake of the Ozarks	Camden	extended aeration	500	050	0081965
W29	Lake Osage Apartments	SW SW 1,39,16	Lake of the Ozarks	Camden	extended aeration	90	009	0081931
W30	Camp Sabra	NE SW 7,40,16	Lake of the Ozarks	Morgan	1-cell lagoon	50	005	0056324
					septic tank/s f	30	003	
W31	Waters Edge Condo	NW NW 34,40,16	Lake of the Ozarks	Camden	extended aeration	1,272	084	0054348
W32	Fawn Valley Commun	NE NE 5,39,18	Lake of the Ozarks	Camden	extended aeration	500	050	0054071
W33	Kirkwood Lodge	S 6,39,15	Trib to Lake of the Ozarks	Camden	septic tank/s f	60	006	0044768
W34	Hawk Nest Lodge	NW SE 11,39,16	Lake of the Ozarks	Camden	extended aeration	436	044	0101168
W35	Headwaters Motel	SW 22,40,22	Trib to Lake of the Ozarks	Benton	1-c lagoon	36	003	0043982
W36	Harbor Houses Condo	SE NE 33,41,17	Soap Ck	Morgan	1-c lagoon	74	007	0034151
W37	Mariner's Cove Subd	SW 11,39,16	Lake of the Ozarks	Camden	extended aeration	321	032	0034004
W38	Ft Leonard Wood Rec Area (S)	NW NW 32,39,15	Lake of the Ozarks	Camden	2-c lagoon	50	002	0029777
W39	Ft Leonard Wood Rec Area (N)	NE NE 30,39,15	Lake of the Ozarks	Camden	3-c lagoon	161	011	0029769
W40	Windjammer Condo	NE NE 21,40,16	Lake of the Ozarks	Camden	extended aeration	130	013	0100471
W41	Town and Country Motel	SE SE 10,39,16	Trib to Lake of the Ozarks	Camden	extended aeration	113	004	0100889
W42	Osage Beach Skelly	SW SE 16,39,16	Lake of the Ozarks	Camden	extended aeration	13	002	0101443
W43	Fifty-eight Facets Spa Resort	SW SE 19,40,16	Lake of the Ozarks	Camden	extended aeration	183	019	0099988
W44	Eagle Point Condo	28,40,16	Lake of the Ozarks	Camden	extended aeration	30	003	0099805

TABLE 31-2—SUMMARY OF POINT SOURCE IMPACTS AND MANAGEMENT NEEDS

Waste Trt. Mgnt. Area	Type Sewerage Facility	Receiving Water Impacts					Freq. Non-Compliance	Management Needs/ Priority	Expected Beneficial Use Improvement	Future DNR Monitoring Needs	Recommended Action
		Estimated		Observed							
		Impact	Miles	Impact	Miles	Severity					
Camdenton	2-c lagoon #1 (C P White)			No impact 82				Eliminate, regional facility/Low	Public health benefit	Low-flow survey after upgrade	Refer to Grants Admin Sect.
	2-c lagoon #2 (Cedar St)			No impact 82				Eliminate, regional facility/Low	Public health benefit	Low-flow survey after upgrade	Refer to Grants Admin. Sect.
	1-c lagoon #3 (Factory Rd.)			No impact 82				Eliminate, regional facility		Effluent analyses for toxic metals and organics	Refer to Grants Admin. Sect.
	1-c lagoon #4 (Wilkerson Ave)			No impact 82				Eliminate regional facility/Low	Public health benefit	Low-flow survery after upgrade	Refer to Grants Admin Sect
	1-c lagoon #5 (Clint Ave.)			No impact 82				Eliminate, regional facility/Low	Public health benefit	Low-flow survey after upgrade	Refer to Grants Admin. Sect.
	1-c lagoon #6 (Parish Subd.)			No impact 82				Eliminate, regional facility/Low	Public health benefit	Low-flow survey after upgrade	Refer to Grants Admin. Sect.
Cole Camp	Oxidation ditch			Reduced benthos, discoloration 83	2.0 C	Aff		Proper O&M/Low	Minor aesihetic improvement, improved aq habitat	Low-flow survey 84	Continued observation by R.O.
Lincoln (E) (1-c lagoon in Basin 34)	1-c lagoon			Aesthetic problems 82, 83	0-1 0 U 0 5- 1 0 U	Poll Aff	X/12	Eliminate and replace with 3-c lagoon/Low	Minor aesthetic improvement	Low-flow survey after upgrade	Refer to Compliance and Grants Admin. Sects.
Linn Ck	1-c lagoon			Unknown due to gravel dredging operation			X/12	Upgrade or replace/Low	None	Low-flow survey after upgrade	Refer to Compliance Sect.
Warsaw	3-c lagoon			Green water, reduced benthos 83	0 1 P	Aff				Low-flow survery after upgrade	Continued observation by R O

Former Hulett Lagoon Site
Combined PA/SI
Reference 11

JOHN ASHCROFT
Governor

FREDERICK A. BRUNNER
Director



Division of Environmental Quality
Division of Geology and Land Survey
Division of Management Services
Division of Parks and
Historic Preservation

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
Jefferson City Regional Office
1001A Southwest Boulevard
P.O. Box 176
Jefferson City, MO 65102
314-751-2729

June 20, 1986

1.720 Camdenton

Ms. Trudy Marco
Grants Coordinator
City Hall
P.O. Box 399
Camdenton, MO 65020

Dear Ms. Marco:

Enclosed is the report and checklist from the audit of your approved Pretreatment Program implementation, as conducted by Leora M. Reising of my staff. If you have any questions concerning this report please call Leora M. Reising or Jerry Croy at (314) 751-2729.

Sincerely,

JEFFERSON CITY REGIONAL OFFICE

B.R. Kesler
Regional Administrator

BRK/LR/ko

Enclosure

cc: Water Pollution Control Program, Attn: Rich Kuntz

Pretreatment Compliance Audit
City of Camdenton
NPDES Permit Numbers
C.P. White - MO-0048569
Dump - MO-0048585
Hulett - MO-0048577
Wilkerson-Clint - MO-0048607
Parish - MO-0048593

June 20, 1986

On April 15, 1986 an audit was conducted of the Industrial Pretreatment Program as implemented by the City of Camdenton, Ms. Trudy Marco and Mr. D. Roger Elder represented the city and Ms. Leora M. Reising represented the Missouri Department of Natural Resources.

The City of Camdenton received approval to implement the Industrial Pretreatment Program on September 26, 1983 by the Missouri Department of Natural Resources. The City of Camdenton operates five lagoons. However, only one lagoon is of interest to the Industrial Pretreatment Program, that is the Hulett (a.k.a. Factory) lagoon.

FINDINGS:

The City of Camdenton has jurisdiction over their entire collection and treatment system. They operate five lagoons, only one receives an industrial waste. The Hulett lagoon receives the waste from Sunstrand Tubular Products, Inc.

Sunstrand Tubular Products, Inc. is a manufacturer of aluminum and copper components and heat transfer coils for air conditioners, used in homes, automobiles, and various industries. The manufacturing process consists of aluminum and copper cutting and brazing, aluminum etching, and a small amount of chromium electroplating They have installed a pretreatment system to remove heavy metal components from their wastewater primarily from the aluminum etching process. The system was finished prior to the pretreatment audit but the reagent tanks were still being filled so it was not in operation.

The City of Camdenton has not developed their sampling, inspection, and permitting procedures. They need to address a variety of topics in their pretreatment program. An increase in personnel familiar with pretreatment and/or sampling and tracking procedures would be helpful. Parts of the program could be contracted to consultants.

The city personnel involved have been very conscientious but they are working with a handicap of not enough time and resources.

RECOMMENDATIONS:

1. Establish, document, and implement formal sampling procedures.

2. Pursue enforcement actions as specified by the federal pretreatment regulations.

3. Establish local limits with regards to production rates, method of waste treatment, method of sludge disposal, and NPDES discharge limits.

4. Have adequate personnel available or on contract for sampling, analyzing, monitoring, tracking, and enforcing the pretreatment program.

5. Up-date city ordinances and policies with any changes in the federal pretreatment program.

6. Submit all changes of your sewer use ordinance and pretreatment program to the Department of Natural Resources for approval.

Should you have any questions please call the Jefferson City Regional Office at (314) 751-2729.

Submitted By:

Leora M. Reising
Environmental Specialist

Approved By:

B.R. Kesler
Regional Administrator

LR/ko

Enclosure

INSPECTED BY Leona M. Reising DATE OF AUDIT 9/16/86

POTW PRETREATMENT PROGRAM AUDIT

1. General Information
   (A) NAME OF PERMITTEE: CITY OF CAMDENTON (B) NPDES # MO-0045577
   (C) MAILING ADDRESS: CITY HALL
   P.O. BOX 399
   CAMDENTON MO 65020
   . HULETT (AKA. FACTORY)
   (D) POTW ADDRESS: NONE
   (E) POTW REPRESENTATIVE: D. ROGER ELDER
   (F) TITLE: CITY ADMINISTRATOR
   (G) TELEPHONE NO: (314) 346-3600
   (H) PRETREATMENT PROGRAM APPROVAL DATE: 9/26/83
   PREVIOUS PRETREATMENT AUDIT: ___/___/___ NONE

2. POTW Information
   (A) DESIGN DRY WEATHER FLOW 26,500 GD ~~(mgd)~~
   (B) AVERAGE ANNUAL FLOW _____ (mgd)
   (C) PERCENT INDUSTRIAL FLOW UNKNOWN %
   (D) SEWER SYSTEM: SEPARATE X COMBINED ____
   (E) LEVEL OF TREATMENT: Primary..... ___ TYPE:
   Secondary..... X LAGOON
   Advanced Secondary..... ___
   Tertiary..... ___
   (F) METHOD OF SLUDGE DISPOSAL: NOT APPL.

3. Summary of Program Evaluation

		(S)	(U)	(R)	N/A
(A)	Legal Authority	X			
(B)	Local Limits			X	
(C)	Inspection and Monitoring Procedures			X	
(D)	Control Mechanism and Enforcement			X	
(E)	POTW Records and Public Participation			X	
(F)	Program Resources			X	

(S) - Satisfactory (U) - Unsatisfactory

(R) - Revisions to Program Needed

LEGAL AUTHORITY

1. POTW Jurisdiction	Yes	No	N/A
(A) Are all industrial contributions within the POTW's jurisdiction.....	X	___	___
(B) Is this jurisdictional situation as documented in the approved pretreatment program.....	X	___	___
If not, have legal agreements/contacts been entered into with new jurisdictions.....	___	___	X
(C) Are exiting pretreatment agreements with contributing jurisdictions proving to be effective for regulating IUs in those jurisdictions.....	___	___	X

COMMENTS:

2. Sewer Use Ordinance (SUO)

(A) Is the current SUO identical to that in the approved pretreatment program.....	X	___	___
If not, were revisions approved by the State	___	___	

If not, did unapproved changes occur to sections on:

- o General Prohibitions..... ___
- o Specific Prohibitions..... ___
- o Local Limits..... ___
- o Categorical Standards..... ___
- o Control Mechanisms..... ___
- o Inspection, Surveillance & Monitoring..... ___
- o Compliance & Enforcement..... ___
- o Confidentiality Requirements..... ___
- o Special Agreements/Waivers..... ___

COMMENTS:
A new SUO is being prepared.

3. Summary Evaluation of Legal Authority	(S)	(U)	(R)
COMMENTS:	X	___	___

LOCAL LIMITS

1. Status

	Yes	No
(A) Does the POTW have local limits.....	X	
If yes, are local limits technically based.....		X
(B) Do local limits exist for:		
BOD.....	X	
TSS.....	X	
Ammonia.....		
Cadmium.....		
Chromium (T).....	X	
Chromium (VI).....	X	
Copper.....	X	
Cyanide.....		
Mercury.....		
Nickel.....		
Silver.....		
Zinc.....	X	
Phenols.....		
Chlorinated Hydrocarbons (T).....	X	
Other.....		

If yes specify oil & grease

(C) Are removal credits employed.....		X
(D) If there is more than one POTW treatment plant, are the local limits established specifically for each plant.....		X

only for Hazlett

COMMENTS:

2. Categorical Industries

(A) Number of industries affected by Categorical Standards.....	1	
(B) Number of industries using the combined waste stream formula.....	0	
(C) Number of industries with production based limits.....	0	
(D) Are there categorical industries in the system for which the categorical standard is more stringent than the locally established limits.....		X
If yes: Is the more stringent limit in the control mechanism.....		

4 or 10

COMMENTS:

3. Effectiveness of Local Limits

(A) Is POTW consistently meeting NPDES limits.... ___ X

(B) Has the POTW been free from industrial inhibition/upsets..... ___ X

(C) Are water quality standards being met..... unknown

(D) Has the POTW been free of sludge contamination problems..... ___ X

(E) Has toxicant sampling of POTW influent, effluent and sludge been conducted during the last year..... ___ X

(F) Does the POTW conduct biomonitoring analyses of the effluent..... unknown

COMMENTS:

4. Summary Evaluations of Local Limits

	(S)	(U)	(R)
	___	X	___

COMMENTS:

Sumitomo installed its pretreatment equipment and had it operating this spring (April & May)

INSPECTION AND MONITORING PROCEDURES

1. General

(A) How many facilities were inspected in the last year..... 1 100%

(B) How many facilities were sampled in the last year..... 0 0%

(C) What percentage of inspections were announced..... 0%

(D) What percentage of sampling visits were announced..... N/A %

COMMENTS:

2. Procedures

		Yes	No
(A)	Are formal sampling and inspection procedures established.....	___	X
(B)	Are inspectors provided with safety equipment	X	___
(C)	Are samples split with industry personnel....	N/A	___
(D)	Are all samples properly preserved.....	N/A	___
(E)	Are chain-of-custody procedures employed.....	N/A	___
(F)	Do all analyses conform to EPA methodologies.	N/A	___
(G)	Is there a QA/QC program for sample analyses.	N/A	___

COMMENTS: The city has not taken samples at Sunstrand.

3. Summary Inspection and Monitoring Evaluation

	(S)	(U)	(R)
COMMENTS:	___	___	X

CONTROL MECHANISM AND ENFORCEMENT

Indicate the type(s) of control mechanism employed:

Permit System..... ____
Contracts..... ____
Sewer Use Ordinance..... X
Other..... ____ Specify: ____

1. Control Mechanism

		Yes	No	N/A
(A)	Is the control mechanism as described in the approved program.....	X	___	___
(B)	Are all significant industrial users regulated through the control mechanism.....	___	___	X
(C)	Are permits/contracts:			
	o For a limited duration.....	___	___	X
	o Non-transferrable.....	___	___	X
	o Revocable.....	___	___	X
	o Able to be modified.....	___	___	X
(D)	Do permits/contracts:			
	o Contain local limits.....	___	___	X
	o Contain categorical standards.....	___	___	X
	o Contain compliance schedules.....	___	___	X

COMMENTS:

2. Noncompliance and Enforcement

(A)	How many categorical industrial users (CIUs) were found to be out of compliance with local or categorical discharge limits (whichever is more stringent) during the past year.....	1	___	___
	How many of these CIUs regained compliance during the same period of time.....	0	___	___
(B)	How many significant industrial users (SIUs) were found to be out of compliance with local discharge limits during the past year.....	___	___	N/A
	How many of these SIUs regained compliance during the same period of time.....	___	___	N/A

(C) List enforcement actions taken to bring violators into compliance.

Administrative	Yes	No	How many times
o Verbal warning	X		
o Written warning	X		
o Notice of violation letter		X	
o Compliance schedule		X	
o Revoke permit		X	
o Termination of service		X	
o Other (specify) _____		X	

Legal			
o Consent decree		X	
o Civil penalties		X	
o Criminal penalties		X	
o Injunctive relief		X	
o Other (specify) _____		X	

(D) How many IUs are currently operating under a compliance shcedule to correct discharge violations..... 1

(E) What percentage of all IUs regulated under the POTW pretreatment program are in compliance with pretreatment standards at the present time 0

COMMENTS:

3. Summary Control Mechanism & Enforcement Evaluation (S) (U) (R)

COMMENTS: ___ ___ X

POTW RECORDS AND PUBLIC PARTICIPATION

1. Industrial Waste Survey (IWS)

	Yes	No
(A) Is the IWS periodically updated.....	___	X
(B) Have all new industrial discharges been adequately characterized.....	X	___
(C) Have any industries been removed from the list of significant dischargers.....	___	X

COMMENTS:

2. Report Review & Analysis

(A) Are (inspection) and sampling records well organized and readily retrievable.....	X	___
(B) Are sampling results checked against discharge standards.....	N/A	___
(C) Are appropriate actions taken in response to problem monitoring reports.....	N/A	___
(D) Are all records maintained for 3 years.....	X	___

COMMENTS: no sampling has been done

3. Industrial Reporting

(A) Has the POTW required self-monitoring reports from industrial users in accordance with categorical standards.....	X	___
(B) Has the POTW required submission of baseline monitoring reports.....	X	___
(C) Are self-monitoring reports and BMR verified by field inspections.....	X	___

COMMENTS:

4. Public Participation

	Yes	No	N/A
(A) Did the POTW publish an annual notice of violators in local newspapers.....	___	X	
(B) Are all program records available to the public..	X	___	
(C) Has public comment been solicited during revisions to the SUO and or local limits.....	X	___	___

COMMENTS:

5. Summary POTW Records and Public Participation Evaluation

(S)	(U)	(R)
___	___	X

COMMENTS:

PROGRAM RESOURCES

1. Manpower

	Yes	No
(A) Are adequate personnel provided in the following areas:		
o Sampling	___	X
o Sample analyses	N/A	___
o Inspection	___	X
o Administration	X	___
o Legal	X	___
o Technical Review	___	___
(B) Do available personnel have appropriate training	___	X
(C) Is a commercial lab used	___	___

If yes, for what analyses: _____

_____

COMMENTS:

2. Equipment

(A) Is adequate sampling equipment available	___	___
(B) Is adequate safety equipment available	___	___
(C) Are an adequate number of vehicles available	___	___
(D) Is the analytical lab adequately equipped	___	___

COMMENTS:

3. Funding

(A) Is the program adequately funded	___	___
(B) Is funding expected to continue at an adequate level	___	___

COMMENTS:

4. Summary Evaluation of Resources

(S)	(U)	(R)
___	___	X

COMMENTS:

Former Hulett Lagoon Site
Combined PA/SI
Reference 12

SUNDSTRAND

Victoria M. Haines
Environmental, Health & Safety Counsel

Direct Dial: 815-226-6136
Law Dept. Fax: 815-226-3202
e-mail: ccglath@snds.com

February 5, 1999

RECEIVED
FEB 8 1999
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Valerie Wilder
Environmental Specialist
Hazardous Waste Program
Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

RE: Missouri Department of Natural Resources' December 18, 1998 Letter Preliminary Assessment/Site Inspection - Former Hulett Lagoon

Dear Ms. Wilder:

This letter and attachments are voluntarily submitted on behalf of Sundstrand Corporation ("Sundstrand") in response to the Missouri Department of Natural Resources' ("MDNR") December 18, 1998 letter to Sundstrand requesting written responses to specific questions set forth in the letter. It is Sundstrand's understanding that this is not a "notification and request for information" pursuant to 104(e) of the Comprehensive, Environmental Response, Compensation & Liability Act of 1980, as amended, ("CERCLA"), given the MDNR does not have the authority to issue such a request. Rather this request is made as part of MDNR's Preliminary Assessment /Site Inspection under CERCLA at the former Hulett Lagoon, a closed lagoon which was part of the City of Camdenton's publicly owned wastewater treatment facility ("POTW") permitted under the Clean Water Act. Nevertheless, Sundstrand is voluntarily providing responses and documents to this request as well as identifying appropriate references to the Modine Manufacturing Company ("Modine") and MDNR files.

By cooperating with the MDNR, Sundstrand does not waive any rights or defenses that it may have to this or subsequent requests or actions. The responses to any of the questions in the attachment should not be construed as an admission of any liability on the part of Sundstrand. Further, none of the material or responses supplied

4949 Harrison Avenue, Post Office Box 7003, Rockford, Illinois 61125-7003
Telephone 815.226.6000 • Fax 815.226.2699

herein should be construed as an admission of wrong-doing or evidence of any violation of federal, state, or local statutes or ordinances.

In summary, Sundstrand's understanding is that the former Sundstrand Tubular Products facility ("Facility"), located in Camdenton, Missouri, and operated from 1972 to 1990, did discharge wastewater into the City of Camdenton's sewer system as authorized by the Missouri Clean Water Act and pursuant to a pretreatment permit. Sundstrand is currently unaware of any waste containing TCE which was disposed of by Sundstrand at or near the Hulett Lagoon other than through the sewer system. It is our understanding that Modine, the current owner of the Facility is undergoing RCRA closure and is testing and remediating the soils and groundwater pursuant to RCRA regulations. Historical documents regarding the use and disposal of hazardous substances were left at the site when the Facility was sold to Modine. Any spills or other releases at the Facility may be documented in Modine's records.

Attached is the information requested in the letter and the documents which support the responses. Although a number of the questions were unclear in certain areas, Sundstrand has provided the information it interpreted the questions to be requesting, instead of objecting to the questions. This was done to facilitate MDNR's inspection time frame. If the MDNR believes that the question was not interpreted properly, Sundstrand will try to be responsive once notified of the discrepancy.

Finally, when Sundstrand sold Sundstrand Tubular Products, Inc. to Modine, a viable corporation continued to exist and operate out of the facility. It therefore seems more efficient, productive and appropriate for the MDNR to seek further information or any remedial actions from the current owner/operator of the Facility, Modine, rather that Sundstrand.

If you have any questions concerning this response, please do not hesitate to call me at 815-226-6136.

Very truly yours,

SUNDSTRAND CORPORATION

Victoria M. Haines

VMH:cmm

652186.1

Sundstrand Corporation's Response to the MDNR's December 18, 1998 Letter
Former Hulett Lagoon, Camdenton, Missouri
Combined Preliminary Assessment/Site Inspection

1. State when Sundstrand Corporation or Sundstrand Tubular Products acquired any interest in or ownership in the site located at 179 Sunset Drive, Camdenton, Missouri, or portion thereof. Provide copies of all documents evidencing or relating to such ownership or interest, including, but not limited to purchase agreements, deeds, or leases, etc.

In 1972 Sundstrand Corporation incorporated Dawson Metal Products, Inc. ("Products"), a Delaware Corporation, as a wholly owned subsidiary of Sundstrand Corporation ("Sundstrand"). On June 29, 1972, Products acquired the business and assets of Dawson Metal Products, Inc. ("Dawson"), a Kansas Corporation. In connection with the acquisition Products, the Delaware corporation, by way of assignment, acquired a leasehold interest in the Sunset Drive property. See Attachment 1. After the acquisition was complete, Dawson, the Kansas corporation, continued in existence.

Sundstrand believes the Sunset Drive property was held by Dawson, the Kansas corporation, pursuant to a lease dated November 28, 1966 between Dawson and the Camdenton Industrial Development Corporation. See Attachment 2. The lease had a term of ten years (which is believed to have commenced July 1, 1967) with an option to Dawson to purchase.

Products, the Delaware corporation, changed its name to Sundstrand Tubular Products, Inc. ("Sundstrand Tubular") on May 25, 1977.

By agreement dated August 24, 1990 Sundstrand agreed to sell the business and assets of Sundstrand Tubular to Modine Manufacturing Company ("Modine"). This transaction was closed on October 18, 1990 and the Sunset Drive property of Products was transferred to Modine by deed dated around October 18, 1990.

On November 27, 1990, Products changed its name to Sundstrand Camdenton, Inc. and on March 15, 1994 Sundstrand Camdenton, Inc. was liquidated.

2. State how long Sundstrand Corporation or Sundstrand Tubular Products held interest or ownership in the site at 179 Sunset Drive, Camdenton, Missouri. State the current status of the Sundstrand Tubular Products Corporation. Provide copies of all documents evidencing or relating to the sale, dissolution, or termination of Sundstrand Tubular Products.

See Response #1.

3. Identify the physical characteristics of the facility during Sundstrand's operations. Provide a facility map showing the location of surface and subsurface features. Include the following in your description:

a. Surface structures (e.g., buildings, tanks, etc.);

b. Underground tanks, pits, and/or vats;

c. Subsurface pipelines, utility lines, sewage and drainage systems; and

d. All construction, alterations, renovations, and/or demolition of the items in 4.a. through 4.c. above.

The Sundstrand Tubular facility ("Facility") was a metal-sided manufacturing facility of approximately 100,000 sq. ft. It was originally constructed by Dawson in 1968 with additions in 1971, 1973, 1977 and 1983. There were no underground storage tanks located at the Facility. The Facility had four small concrete mud pits used to settle solids along the west exterior wall. See Attachment 3. See also MDNR's RCRA files.

4. Describe all processes performed at the facility.

Sundstrand Tubular manufactured heat transfer components for commercial and automotive industries at the Facility. The manufacturing process flowed as follows:

a. Copper and aluminum tubing were fed from rolls to benders to form U shapes and then cut off;

b. Parts were then immersed in alkaline cleaning lines to remove oil and chips;

c. Parts were degreased to remove any remaining oil;

d. Clean parts were assembled and small U shaped copper tubing and aluminum tubing ends were brazed to assembled cores using manual and automatic brazing systems;

e. The assembled heat transfer components were degreased and/or alkaline cleaned and then tightness tested using refrigerant; and

f. Finally, the components were then painted if required by the customer and packaged for shipment. See Attachment 4.

5. Did Sundstrand ever transport to the facility or use, purchase, generate, store, treat, dispose or otherwise handle any hazardous materials at the facility? If the answer to this question is anything but an unqualified a "no," identify:

a. The chemical composition, characteristics, physical state (e.g., solid, liquid) of each hazardous materials transported, used, purchased, generated, stored, treated, disposed or otherwise handled;

b. For each such hazardous material used, state how, when, where and in what quantities the hazardous material was purchased, used, generated, stored, treated, transported, disposed or otherwise handled;

c. Any analyses conducted of the hazardous material so transported, used, purchased, generated, stored, treated, disposed, or otherwise handled, and provide copies of such analyses.

Sundstrand is interpreting the term facility used in this question to mean the manufacturing facility and not the Hulett Lagoon. Purchase and consumption records of materials were maintained solely by Sundstrand Tubular during its operation of the business at the time of Sundstrand Tubular's sale to Modine. Sundstrand believes that Sundstrand Tubular submitted a SARA Tier 2 submittal to the USEPA and State of Missouri in 1989. If the documents still exist, they would be on site and maintained by Modine. (Sundstrand did not take possession of these documents at the time of Sundstrand Tubular's sale to Modine.) See also the MDNR's RCRA files.

6. Did Sundstrand arrange for transportation, disposal or treatment of waste materials, including hazardous substances to the facility? If the answer to this question is anything but an unqualified "no," identify:

a. The persons with whom you made such arrangements;

b. The type of arrangements made;

c. Every date on which such arrangements or shipments took place;

d. The total quantity of waste materials or hazardous substances transported to the site;

e. The amount paid or collected in connection with each transaction, the method of payment, and the identity of the person from whom payment was given or received;

f. The names and addresses of any persons who transported waste materials or

hazardous substances to the site;

g. All documents containing information responsive to subparts a. through f. of this question.

No. Sundstrand Tubular was not a commercial transport, storage and disposal facility and did not bring hazardous wastes onto the Facility for any purpose.

7. Identify to the best of your ability whether any leaks, spills, releases or threats of releases of any kind into the environment of any hazardous materials have or may have occurred at the Sundstrand facility. If yes, please provide the following:

a. When such releases occurred,

b. How the releases occurred,

c. What hazardous substances were released,

d. What amount of each such hazardous substance was so released,

e. Where such releases occurred,

f. Any and all activities undertaken in response to each such release; and

Sundstrand is aware of two potential releases at the Facility. Pursuant to former Dawson employees, a fire broke out at the Facility in the 1960's. In fighting the fire, a washdown occurred in an area where trichloroethylene ("TCE") was utilized. A second alleged release of 4500 gallons of TCE was anonymously reported to the MDNR August 9, 1990. Sundstrand has investigated both situations and concluded that neither release had occurred. Subsequent investigations by Modine in November 1991 and by MDNR in March 1993 also could not confirm that the releases had occurred. See Attachment 5. See also MDNR's RCRA files.

8. State whether, at the time Sundstrand acquired the facility, there was any reason to know or suspect that any hazardous substances were disposed or spilled on, in or at the site.

No.

9. Please submit information on all persons and how they may be contacted (include current work and home addresses and phone numbers) with information relating to any of the above questions.

Mark Chiado, Sundstrand Corporation, Manager, Environmental Planning & Auditing, 815-226-6351

Victoria Haines, Sundstrand Corporation, Environmental, Health & Safety Counsel, 815-226-6136

William R. Coole, Sundstrand Corporation, Associate General Counsel, 815-226-6303

Tom Misiak, The Falk Corporation, President, 414-937-4777

Robert Miller, Sundstrand Corporation, Director, Environmental, Health & Safety, 815-226-2755

William Johnson, Sundstrand Corporation, Risk Manager, 815-226-7820

10. Please indicate whether any of the following individuals are currently employed with Sundstrand Corporation or any subsidiary thereof (include current position/title, work and home addresses and phone numbers):

William R. Coole*
Paul Donovan*
James W. Ethington
Kenelm Groff
Lloyd E. Larson
LeMoyne G. Loseke
Charles E. Martin
Frank G. Malewitz
Thomas F. Otto
Philip W. Polgreen
Ted L. Ross
Richard M. Schilling
Neil D. Traubenberg*
Berger G. ("Bud") Wallin
Donald M. Wills

individuals still employed.

statements therein contained are true.

Genevieve Moroske
Notary Public

My Commission expires: May 31, 1974

Former Hulett Lagoon Site
Combined PA/SI
Reference 13

State of Delaware

Office of Secretary of State.

I, Walton H. Simpson, Secretary of State of the State of Delaware, do hereby certify that the Certificate of Incorporation of the "DAWSON METAL PRODUCTS, INC.", was received and filed in this office the twelfth day of June, A.D. 1972, at 10 o'clock A.M.;

And I do hereby further certify that the aforesaid Corporation is duly incorporated under the laws of the State of Delaware and is in good standing and has a legal corporate existence so far as the records of this office show and is duly authorized to transact business.

In Testimony Whereof, I have hereunto set my hand and official seal at Dover this thirteenth day of June in the year of our Lord one thousand nine hundred and seventy-two.

Walton H Simpson
Secretary of State

R N Caldwell
Ass't Secretary of State

Former Hulett Lagoon Site
Combined PA/SI
Reference 14

No. F-157085

STATE

JAMES C. KIRKPATRICK, Secretary of State

CORPORATION DIVISION

Certificate of Authority

WHEREAS, DAWSON METAL PRODUCTS, INC.

(using in Missouri the name DAWSON METAL PRODUCTS, INC.)

incorporated under the Laws of the State of DELAWARE for a term

of perpetual years and now in existence and in good standing in said State has filed in the office of the Secretary of State, duly authenticated evidence of its incorporation, as provided by law, and has, in all respects, complied with the requirements of General and Business Corporation Law governing Foreign Corporations;

NOW, THEREFORE, I, JAMES C. KIRKPATRICK, Secretary of State of the State of Missouri, by virtue of the authority vested in me, do hereby certify that said corporation is from the date hereof duly authorized to carry on the business of

Sale and distribution of air conditioning equipment and related parts.

in the State of Missouri,

and is entitled to all rights and privileges granted to Foreign Corporations under The General and Business Corporation Law; that the entire amount of its stated capital and surplus is $654,558.00 and $1,000.00 of the amount of stated capital of said corporation is represented by 1,000 shares of common @ $1.00

that the proportion of stated capital and surplus represented in Missouri is $ 647,716.00

and that its registered office in Missouri is located at 314 North Broadway, St. Louis

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the GREAT SEAL of the State of Missouri, at the City of Jefferson, this 25th day of September, 19 72.

James C. Kirkpatrick
Secretary of State

RECEIVED OF: DAWSON METAL PRODUCTS, INC.

Seven hundred sixty-eight and no/00---------- Dollars, $ 768.00

For Credit of General Revenue Fund, on Account of Incorporation Tax and Fee.

No. F-157085

Dorothymae Miller
Deputy Collector of Revenue

CORP #14

Former Hulett Lagoon Site
Combined PA/SI
Reference 15

APPLICATION FOR AN AMENDED CE
FOR A FOREIGN COR

(To be submitted in duplicate by an attorney)

HONORABLE JAMES C. KIRKPATRICK
SECRETARY OF STATE
STATE OF MISSOURI
JEFFERSON CITY, MO. 65102

SUNDSTRAND TUBULAR PRODUCTS, INC., formerly Dawson Metal / Products, Inc., a corporation, pursuant to the provisions of "The General and Business Corporation Law of Missouri" relating to amended certificate of authority of Foreign Corporation, does hereby state,

(1) Its name is Sundstrand Tubular Products, Inc.;

it was incorporated in the State of Delaware; and it was qualified in the State of Missouri on September 25, 1972.

(2) The name it will use in Missouri is Sundstrand Tubular Products, Inc.

(3) The address of its principal office in the state or country of organization is Sunset Drive, Camdenton, Missouri 65020
(Include street and number, if any.)

(4) The address of its registered agent in Missouri is 314 North Broadway, St. Louis, Missouri 63102
(Include street and number, if any.)

and the name of registered agent in Missouri at such address is C T Corporation System

(5) The corporation is qualified under the following states and countries other than Missouri:

NONE

FILED
AND AMENDED CERTIFICATE OF AUTHORITY ISSUED
AUG 29 1977
James Kirkpatrick
Corporation Dept. SECRETARY OF STATE

(6) By appropriate corporate action on May 25, 19 77, the corporation:

1. Changed its corporate name to Sundstrand Tubular Products, Inc.

2. ~~Changed its period of duration to~~

(MO. - 276 - 11/20/68)

[redacted] purposes in the transaction of business

[redacted] as follows: (restate purposes if changed)

(8) There is attached hereto a Certificate of the Secretary of State of the State of Delaware relating to the amendment(s), set forth in item 6 above and showing that the Corporation is in existence and in good standing in said State.

IN WITNESS WHEREOF, the undersigned corporation has caused this application to be executed in its name by its President ~~or Vice President~~ attested by its Secretary ~~or Assistant Secretary~~, this 15th day of July, 19 77.

SUNDSTRAND TUBULAR PRODUCTS, INC.
(Exact Corporate Name)

By LeMoyne G. Loseke
President ~~Vice President~~
LeMoyne G. Loseke

(CORPORATE SEAL)

ATTEST:

Richard M. Schilling
Secretary ~~Assistant Secretary~~
Richard M. Schilling

STATE OF ILLINOIS }
COUNTY OF WINNEBAGO } ss

I, Suzanne L. Lowe, a notary public, do hereby certify that on this 15th day of July, 19 77, personally appeared before me LeMoyne G. Loseke, who, being by me first duly sworn, declared that he is the President of Sundstrand Tubular Products, Inc., that he signed the foregoing document as President of the corporation, and that the statements therein contained are true.

PLACE NOTARY SEAL HERE

Suzanne L. Lowe
Notary Public

My Commission expires: September 29, 1980

FILED
AND AMENDED CERTIFICATE OF AUTHORITY ISSUED
AUG 29 1977

James Fairpatrick
Corporation Dept. SECRETARY OF STATE

[redacted]

Former Hulett Lagoon Site
Combined PA/SI
Reference 17

No. F00157085

STATE OF MISSOURI

ROY D. BLUNT, Secretary of State

CORPORATION DIVISION

Certificate of Withdrawal

WHEREAS, an Application for Withdrawal of

SUNDSTRAND TUBULAR PRODUCTS, INC.

a DELAWARE corporation, has been received, found to conform to law, and filed;

NOW, THEREFORE, I, ROY D. BLUNT, Secretary of State of the State of Missouri, issue this Certificate of Withdrawal, certifying that the afornamed corporation is withdrawn from this state.

IN TESTIMONY WHEREOF, I hereunto set my hand and affix the GREAT SEAL of the State of Missouri. Done at the City of Jefferson, this 18th day of APRIL, 19 91.

Roy D. Blunt
Secretary of State

Corp #27 (1-85)

[redacted]

Former Hulett Lagoon Site
Combined PA/SI
Reference 18

ENVIRONMENTAL SITE ASSESSMENT

MODINE HEAT TRANSFER, INC.
POST OFFICE BOX 636 SUNSET DRIVE
CAMDENTON, MISSOURI

PREPARED FOR:

MODINE MANUFACTURING COMPANY
1500 DEKOVEN AVENUE
RACINE, WISCONSIN

RECEIVED
DEC 23 1991
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

PREPARED BY:

LAW ENVIRONMENTAL, INC.
911 WASHINGTON AVENUE, SUITE 160
ST. LOUIS, MISSOURI

LAW ENVIRONMENTAL PROJECT NO. 53-1543

NOVEMBER 1991

TABLE OF CONTENTS

Page Number

1.0 BACKGROUND INFORMATION 1

2.0 PURPOSE 1

3.0 WORK COMPLETED 1

4.0 SUMMARY OF SITE CONDITIONS 3

4.1 Soil Description 3
4.2 Site Geology 3
4.3 Site Hydrogeology 3

5.0 RESULTS OF LABORATORY ANALYSES 4

6.0 CONCLUSIONS 4

7.0 RECOMMENDATIONS 5

TABLES

Table 1 Summary of Field Organic Vapor Analyses of Soil Samples
Table 2 Summary of Soil Laboratory Analyses

FIGURES

Figure 1 Site Location Map
Figure 2 Generalized Site Plan Showing Manufacturing Plant Premises
Figure 3 Area #1 Detail Map with Hand Auger Boring Locations and Analytical Results of Soil Samples
Figure 4 Area #2 Detail Map with Soil Boring Locations and Analytical Results of Soil Samples

APPENDICES

Appendix A Soil Boring Logs
Appendix B Laboratory Data Sheets

1.0 BACKGROUND INFORMATION

The project site is a manufacturing plant located in Camdenton, Missouri (Figure 1). The plant formerly operated as the Sundstrand Tubular Product, Inc. facility, a subsidiary of the Sundstrand Corporation, prior to the October 19, 1990 acquisition by Modine Heat Transfer, Inc., a subsidiary of the Modine Manufacturing Company. The plant is currently operating as the Modine Heat Transfer, Inc. facility producing heat transfer products, and is a RCRA generator. It is our understanding that the facility has submitted a Part B operating permit application and is currently operating under interim status.

The plant has used 1,1,1-trichloroethane (TCA) for degreasing operations since December, 1990. The plant generated trichloroethylene (TCE) waste during degreasing operations from the early 1970's to December 1990. According to information obtained from Modine Manufacturing Company, the TCE waste was containerized in 55 gallon drums and stored outside the plant in two separate locations from the early 1970's to 1983. One area of storage was located along the south outer wall of the plant where the drums were placed on a concrete pad (Area 1). The Missouri Department of Natural Resources suggested to Modine that an alleged 4,500 gallon release of spent solvent occurred at the plant. It is our understanding that a building addition was erected over the spill area in 1983. Another storage area was located along the outer west wall of the plant building (Area 2). Information pertaining to the exact location and leak history of this storage area is not readily available to Law Environmental at this time. Figure 2 is a generalized site plan showing locations of Areas 1 and 2.

2.0 PURPOSE

The purpose of this project was to assess site soil in Areas 1 and 2 for the presence of TCE. The tasks performed include drilling soil borings for the purpose of collecting soil samples for laboratory analyses and preparation of this summary report.

3.0 WORK COMPLETED

Five soil borings were drilled in an area where Don Mans of Modine believed the leakage of the TCE from the fifteen 55-gallon drums occurred (Area 1). Three of these borings (HA-1, HA-2, and HA-3) were drilled from the plant floor surface and two of these borings (HA-4 and HA-5) were drilled from the floor of the degreasing machine pit. The floor of the degreasing machine pit is approximately 5.5 feet below the plant floor surface. See Figure 2 for location of Area 1 and Figure 3 for a detail map of Area 1 showing boring locations. The concrete floor of the plant was cored by the use of an electric core drill. Borings were drilled and soil samples collected by the use of a hand auger. Soil samples were collected at two foot intervals to a depth at which the hand auger refused to advance.

Former Hulett Lagoon Site
Combined PA/SI
Reference 19

1.200 Camdenton
MO-0048577; MO-0048593
MO-0048569; MO-0048585
MO-0048607

September 13, 1978

Honorable Ken Mensendiek, Mayor
City of Camdenton
112 Court Circle
Camdenton, Missouri 65020

recorded
5 outfalls

Dear Mayor Mensendiek:

An inspection was conducted of the operation and condition of the wastewater treatment facilities serving the City of Camdenton, Missouri on September 7, 1978. The following unsatisfactory features were observed and recommendations are hereby made for their correction.

UNSATISFACTORY FEATURES:

1. The Hulett Lagoon (#3) is short circuiting the industrial waste.

2. The industrial waste entering the Hulett lagoon appears to kill off the south end of lagoon reducing the facility's effective size.

3. The Clint Lagoon needs its own NPDES permit.

COMMENTS:

The sewage lagoons serving Camdenton seemed for the most part to be well maintained. The Hulett Lagoon, however has a large problem with its industrial influent. The sewage from Sunstrand enters the lagoon at the south end, which is the same end that the discharge pipe is on. The detention time for the industrial waste could not be more than a few hours, far too short a period to treat the waste.

To correct the short circuiting problem, the location of the influent pipe from Sunstrand should be moved to the north end of the lagoon, or the sewage line could be tied in to the other influent line already at the north end.

The strength of the industrial sewage entering Hulett Lagoon is apparently too great for the facility to handle. The City should enforce its sewer use ordinance, if it has one, to prevent misuse of the sewers and sewage treatment facilities.

Our records show no response by the City toward obtaining a permit for the discharge from the Clint Lagoon. It currently is listed in the NPDES Permit #MO-0048607 as the first cell of a two cell lagoon. It has, however, its own discharge point and therefore needs its own permit. Either the effluent pipe in Clint Lagoon shall be capped or a permit shall be applied for from this department. The appropriate forms are enclosed.

RECOMMENDATIONS:

1. Correct the short circuiting in Hulett Lagoon.

2. Enforce or create sewer use ordinances.

3. Apply for discharge permits for Clint and Wilkerson Lagoons.

Sincerely,

Todd Crawford
Environmental Engineer

TC/bc

Enclosures

CC: Jeff Hancock, City Administrator

78-82

Former Hulett Lagoon Site
Combined PA/SI
Reference 20

ENGINEERING GEOLOGIC REPORT ON COLLAPSE POTENTIAL OF CA

CAMDEN COUNTY, MISSOURI

LOCATION: White Lagoons, SW¼, SW¼, NE¼, Sec. 35, T. 38 N., R. 17 W., Macks Creek Quad.
Hulett Lagoon, SW¼, SW¼, SW¼, Sec. 24, T. 38 N., R. 17 W., Macks Creek Quad.
Clint Lagoons, NE¼, NE¼, SW¼, Sec. 24, T. 38 N., R. 17 W., Camdenton Quad.
Parish Lagoon, SE¼, SW¼, NE¼, Sec. 19, T. 38 N., R. 16 W., Camdenton Quad.
Dump Lagoons, NW¼, SW¼, SE¼, Sec. 25, T. 38 N., R. 17 W., Stoutland Quad.

RESULTS:

Investigation of lagoons for the City of Camdenton occurred on September 12, 1978 by Gary St. Ivany and John W. Whitfield. The Camdenton area is underlain by the Gasconade dolomite formation. Layers of chert (one exposed bed was 12 feet thick) and Gunter sandstone were present in the stream beds. Streams were intermittent, with isolated pools and discharge effluent composing most of the flow. Possibilities exist for localized groundwater pollution effecting shallow and poorly cased wells to some extent. Streams in the area drain into Lake of the Ozarks.

The Camdenton lagoons should not be considered in danger of failure by catastrophic collapse, but localized groundwater pollution is possible. For these reasons, the lagoons are designated as Category 2.

Problems exist at the Hulett lagoon site which appear to be design related and not geologic. Effluent was observed bubbling up approximately 40 feet from the discharge pipe. This area appeared to be solid effluent to within 6 inches of the surface. An open channel existed directly from the inlet pipe to the discharge pipe, thus, causing a short circuit. On closer examination, the thick effluent was not solid but floating. It was possible to extend a rod through the effluent to the bottom of the lagoon. Discharge from the lagoon was dark green in color with a thick white foam floating on the surface. If a short circuit does exist in the Hulett lagoon, corrective measures are needed. A possible solution is the location of the inlet pipe at the opposite end of the lagoon to where the discharge pipe is stationed.

This situation may be a result of effluent from the metal fabricating plant that discharges into this lagoon.

John W. Whitfield

John W. Whitfield, Geologist
Applied Engineering & Urban Geology
Geology & Land Survey
September 14, 1978

Gary St. Ivany

Gary St. Ivany, Lab Technician
Applied Engineering & Urban Geology
Geology & Land Survey
September 14, 1978

Up · 09
Low · 099

orig: Jim Odendahl

[illegible] 100 condemnation

called to Jo July 24. Said made & result in early Augus

Former Hulett Lagoon Site
Combined PA/SI
Reference 21

June 21, 1984

JUN 25 1984

COPY

Mr. Frank Dolan, P.E.
Environmental Engineer
Mo. Department of Natural Resources
P.O. Box 1368
Jerrerson City, Missouri 65102

RE: Test results from Camdenton

Dear Mr. Dolan:

Attached is a copy of the test results for Camdenton's Factory Lagoon. The City will be performing another series of tests but, because of the expense we would appreciate your input concerning the actual items requiring retesting. The City will meet with you now or after the second test results are available. Please contact me or Mr. Buc Riley concerning the tests needed and if we need to schedule a meeting at this time.

If you ahve any questions please feel free to contact me or Mr. Riley.

Sincerely,

James C. Jackson, P.E.

JCJ:sw
enc.
cc: Mr. Curtis Ogg
City of Camdenton

MMTL
Analytical Services

Columbia, MO 65201
314/874-8080

114 East Elm, Suite 3
O'Fallon, MO 63366
314/281-2858

Client: Camdenton, City of
PO Box 399
Camdenton MO 65020

Date Reported: 06/15/84
Date Sampled: 05/22/84
Date Received: 05/23/84

Attention: Bud Riley

MMTL Report No: 17509

Customer P. O. Number: 20502

MMTL Account No: 10238

REPORT OF ANALYSIS

Sample No.	Units	Results
SAMPLE #1		
Residue, Total Suspended	MG/L	2
Total Chromium	MG/L	< .02
Chromium, Hexavalent	MG/L	< .02
Total Copper	MG/L	< .02
Total Zinc	MG/L	.04
SAMPLE #2		
Residue, Total Suspended	MG/L	37
Total Chromium	MG/L	.28
Chromium, Hexavalent	MG/L	< .02
Total Copper	MG/L	2.3
Total Zinc	MG/L	.12
Halocarbons		*
Toluene	UG/L	< 10
Trichloroethylene	UG/L	28
Grease & Oil, gravimetric	MG/L	41
SAMPLE #3		
Residue, Total Suspended	MG/L	6
Total Copper	MG/L	.11
Total Zinc	MG/L	.20
Grease & Oil, gravimetric	MG/L	< 5
SAMPLE #5		
Total Chromium	MG/L	18
Total Copper	MG/L	1400
Total Zinc	MG/L	100
Per Cent Dry Solids	%	3.0

Comments:
*See attached table.

Approved by: _____

Sample #2

Name	Sample Concentration ug/L
Bis(2-chloroisopropyl) ether	<1
Bis(2-chloroethyl) ether	10
Bis(2-chloroethoxy) methane	<1
4-Chlorophenyl phenyl ether	10
4-Bromophenyl phenyl ether	<5

MMTL
Analytical Services

314/874 8080

114 East Elm Suite 3
O'Fallon, MO 63366
314/281-2658

Client: Sunstrand Tubular Products, Inc.
PO Box 636, Sunset Drive
Camdenton MO 65020

Date Reported: 06/15/
Date Sampled: 05/22/84
Date Received: 05/23/84

Attention: Don Mans

MMTL Report No: 17510

Customer P. O. Number: 1518

MMTL Account No: 10109

REPORT OF ANALYSIS

Sample No.	Units	Results
SAMPLE #4		
Residue, Total Suspended	MG/L	16
Total Chromium	MG/L	< .02
Chromium, Hexavalent	MG/L	< .02
Total Copper	MG/L	.51
Total Zinc	MG/L	.30
Haloethers		*
Toluene	UG/L	15
Trichloroethylene	UG/L	41
Grease & Oil, gravimetric	MG/L	18

for Sunstrand

Comments:

*See attached table

Approved by: _____

Sample #4

Name	Sample Concentration ug/L
Bis(2-chloroisopropyl) ether	<1
Bis(2-chloroethyl) ether	140
Bis(2-chloroethoxy) methane	<1
4-Chlorophenyl phenyl ether	5
4-Bromophenyl phenyl ether	<5

Report Number 17693-1

Name	Sample Concentration ug/L
Bis(2-chloroispropyl) ether	1500
Bis(2-chloroethyl) ether	190
Bis(2-chloroethoxy) methane	34
4-Chlorophenyl phenyl ether	<5
4-Bromophenyl phenyl ether	<5

Report Number 17692-1 samples from lagoon AUG 22 1984

Name	Sample Concentration ug/L
Bis(2-chloroispropyl) ether	29
Bis(2-chloroethyl) ether	250
Bis(2-chloroethoxy) methane	320
4-Chlorophenyl phenyl ether	<5
4-Bromophenyl phenyl ether	<5

Former Hulett Lagoon Site
Combined PA/SI
Reference 22

City of Camdenton
112 Court Circle P.O. Box 3
Camdenton, Mo. 65020
314 346 3600

August 20, 1984

Mr. Frank Dolan
Department of Natural Resources
P.O. Box 1368
Jefferson City, Missouri 65102

Dear Mr. Dolan:

This is to confirm our meeting for Monday, August 27, 1984 at 10:00 AM, at City Hall on the pre-treatment program.

Enclosed you will find the second sample results.

Sincerely,

Warren W. Riley, Jr.
City Administrator

WWR/kb

cc: Mayor Kelsey
Mr. Jim Jackson, Jackson Engineering
Mr. Tom Misiak, Sundstrand Tublar Products
Mr. Curtis Ogg, Jefferson City Regional Office

MMTL
Analytical Services

Columbia, MO 65201
314/874-8080

114 East Elm, Suite 3
O'Fallon, MO 63366
314/281-2858

AUG 22 1984

Client: Camdenton, City of
PO Box 399
Camdenton MO 65020

Date Reported: 08/14/84
Date Sampled: 07/19/84
Date Received: 07/20/84

Attention: Bud Riley

MMTL Report No: 17692

Customer P. O. Number:

MMTL Account No: 10238

REPORT OF ANALYSIS

Sample No.	Units	Results
#2		
Residue, Total Suspended	MG/L	95
Total Chromium	MG/L	.5
Chromium, Hexavalent	MG/L	.20
Total Copper	MG/L	4.1
Total Zinc	MG/L	.23
Haloethers		*
Toluene	UG/L	< 10
[illegible]	UG/L	500
Grease & Oil, gravimetric	MG/L	6

Comments: *See Attached Table

Approved by: Dan Hoge

Page No. 1

Report Number 17692-1 samples from lagoon AUG 22 1984

Name	Sample Concentration ug/L
Bis(2-chloroispropyl) ether	29
Bis(2-chloroethyl) ether	250
Bis(2-chloroethoxy) methane	320
4-Chlorophenyl phenyl ether	<5
4-Bromophenyl phenyl ether	<5

MMTL
Analytical Services

Columbia, MO 65203
314/874-8080

114 East Elm, Suite 3
O'Fallon, MO 63366
314/281-2658

To: Jim Jackson
Sunstrand effluent

Client: Sunstrand Tubular Products, Inc.
PO Box 636, Sunset Drive
Camdenton MO 65020

Date Reported: 08/14/84
Date Sampled: 07/19/84
Date Received: 07/20/84

Attention: Don Mans

MMTL Report No.: 4035

Customer P. O. Number:

MMTL Account No.: 10107

REPORT OF ANALYSIS

Sample No.	Units	Results
#4		
Residue, Total Suspended	MG/L	320
Total Chromium	MG/L	7.6
Chromium, Hexavalent	MG/L	< .02
Total Copper	MG/L	29
Total Zinc	MG/L	1.4
Halomethers		*
Toluene	UG/L	< 1000
Trichloroethylene	UG/L	4900
Grease & Oil, gravimetric	MG/L	1400

Comments: *See Attached Table

Approved by: _____

1,100 - Camdenton
PT

Former Hulett Lagoon Site
Combined PA/SI
Reference 23

City of Camdenton...

112 Court Circle P.O. Box 399
Camdenton, Mo. 65020
314 - 346 - 3600

May 27, 1986

Ms. Leora M. Reising
Environmental Specialist
Department of Natural Resources
Jefferson City Regional Office
1001A Southwest Boulevard
P.O. Box 176
Jefferson City, Missouri 65102

Dear Ms. Reising:

As you are aware, the City of Camdenton has one (1) industry and it is the only industry involved in pretreatment.

With joint efforts between Sundstrand and the City of Camdenton, a CDBG Grant was obtained from the state to construct the retreatment plant for Sundstrand.

The plant has been completed and has been on the line since April 14, 1986. With the exception of some minor start-up problems, the plant appears to be functioning properly. Sundstrand will furnish the City data as it pertains to their testing which will be forwarded to you and your department.

If you have any questions, please feel free to contact me or Trudy Marco.

Sincerely,

Donald Roger Elder
City Administrator

DRE/bc

cc: Mayor Kelsey
Trudy Marco, Grant Coordinator

IDG-011 - Camdenton

Permit Number 2263

Former Hulett Lagoon Site
Combined PA/SI
Reference 24

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESO
MISSOURI CLEAN WATER COMMISSION

1.110 Camdenton

CONSTRUCTION PERMIT

The Missouri Department of Natural Resources hereby issues a permit to: City of Camdenton
112 Court Circle
P.O. Box 399
Camdenton, MO 65020

for the construction of (describe facilities):

SEE ATTACHED SHEET

Permit Conditions:

Construction of such proposed facilities shall be in accordance with the provisions of the Missouri Clean Water Law, Chapter 204, RSMo, and regulations promulgated thereunder, or this permit may be revoked by the Department of Natural Resources.

As the Department of Natural Resources does not examine structural features of design or the efficiency of mechanical equipment, the issuance of this permit does not include approval of these features.

A representative of the Department may inspect the work covered by this permit periodically during construction. Issuance of an operating permit by the Department will be contingent on the work substantially adhering to the approved plans and specifications.

This permit applies only to the construction of wastewater treatment facilities; it does not apply to other environmentally regulated areas.

September 23, 1986
Effective Date

Frederick A. Brunner, Ph.D.
Director, Department of Natural Resources

March 23, 1988
Termination Date

Director of Staff, Clean Water Commission

Filing Fee Paid

WQP 3.34

CONSTRUCTION PERMIT

SEWERS AND FORCE MAINS: 4,625 lineal feet of 8 inch diameter sewer pipe and 2,367 lineal feet of 6 inch diameter force main as shown on the approved plans.

LIFT STATIONS: A packaged dry well lift station with two pairs of pumps. Each pair of pumps will be capable of discharging at a rate of 175 gpm at a total dynamic head of 185 feet.

These facilities are designed to eliminate the existing factory lagoon, NPDES #MO-0048577, and transport the wastes from the new Sunstrand Expansion to the C.P. White sewage collection system.

Discharge is to be into the C.P. White Lagoon, NPDES # MO-0048569.

Former Hulett Lagoon Site
Combined PA/SI
Reference 25

MISSOURI DEPARTMENT OF NATURAL RESOUI
DIVISION OF ENVIRONMENTAL QUALITY
LABORATORY SERVICES PROGRAM

DEC 15 1987

Pretreatment Monitoring Report
Sundstrand Tubular Products, Inc.
Camden County, Missouri
April 30, 1987

INTRODUCTION

At the request of the Water Pollution Control Program a pretreatment monitoring survey was conducted of the industrial wastewater discharge of the Sundstrand Tubular Products factory in Camden County, Missouri. Sampling was conducted from 1500 through 1530 on April 30, 1987 by Lon O'Bannon, III of the Laboratory Services Program, Division of Environmental Quality.

METHODS

A grab sample (87-1111) was collected of the effluent from the treatment system discharge weir.

All analyses were performed by the Division's Laboratory in Jefferson City. All analyses were conducted in accordance with methods outlined in the Missouri Clean Water Commission Effluent Regulation (10 CSR 20-7.015).

OBSERVATIONS

The sample was light yellow-green and nearly clear.

RESULTS

See the attached analytical results.

Submitted by Lon O'Bannon, III

Lon O'Bannon, III
Water Quality Specialist
Field Services Section
Laboratory Services Program

Date December 7, 1987

Approved by James H. Long

James H. Long
Director
Laboratory Services Program

cc: Richard Kuntz, Permits Section, Water Pollution Control Program
Bill Kesler, Regional Administrator, Jefferson City Regional Office

LABORATORY SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 87-1111

Reported to: LON O'BANNON III
Affiliation: WQM

Date: 12/01/87
Project Code: 3211/3222

Sample Description:
SUNDSTRAND TUBULAR PRODUCTS, INC. - CAMDEN CO.
PRETREATMENT MONITORING.
GRAB FROM TREATMENT SYSTEM DISCHARGE WEIR TANK

Collected by: LON O'BANNON III
Affiliation: WQM

Date: 04/30/87

PARAMETERS	RESULTS
CYANIDE	<0.05 mg/L
TOTAL SILVER	<1 ug/L
TOTAL CADMIUM	<2 ug/L
TOTAL CHROMIUM	2,700 ug/L
TOTAL COPPER	890 ug/L
TOTAL HEX. CHROMIUM	180 ug/L

Sample no. 87-1111
Date 12/01/87

PARAMETERS	RESULTS
TOTAL NICKEL	50 ug/L
TOTAL LEAD	<5 ug/L
TOTAL ZINC	110 ug/L

VOA RESULT : NO RESULT
COMMENTS: ANALYTICAL ERROR

Former Hulett Lagoon Site
Combined PA/SI
Reference 26

Missouri Engineering Corporation
ENGINEERING CONSULTANTS
P.O. BOX 13
ROLLA, MISSOURI 65401 • PHONE: 314-364-4003

April 25, 1988

APR 26 1988

Dave Friese
Department of Natural Resources
Water Pollution Control Program
P. O. Box 176
Jefferson City, MO 65102

Dear Dave:

You will find enclosed a copy of the sludge analysis report on the sludge from the abandoned Hulett Lagoon in Camdenton, Missouri. I have calculated the amount of dry sludge, based on an average of 9" thickness, at approximately 1250 cubic yards. 9375 gallons

The soil available in the berms to be mixed with the sludge if left on site would be approximately 2000 cubic yards.

I am also sending a copy of this letter to Ken Arnold. Would you both please review the data and let me know what the next step can be?

Sincerely,

MISSOURI ENGINEERING CORP.

Charles Ray

Charles Ray
CR/lc
Enc.
cc: Mayor Webster, Camdenton
Ken Arnold

Mike Phillip
Susan Ranard

ENVIRODYNE ENGINEERS

12161 Lackland Road
St. Louis, Missouri 63146
(314) 434-6960

REPORT OF ANALYSIS

CLIENT: Valda Mahoney
Missouri Engineering
Post Office Box 13
Rolla, MO 65401

REPORT DATE: April 19, 1988
SAMPLE ANALYZED: Ten sludge samples for metals analysis.

DATE RECEIVED: March 7,1988
PROJ. #: 3222-00353 P.O. #:

Parameter	# 1	# 2	# 3	# 4	# 5	# 6	# 7
Aluminum (MG/L)	55700	67400	97000	89300	79200	47100	52000
Chromium (MG/L)	12400	24300	28900	19000	24300	12300	15600
Cadmium (MG/L)	< 26.0	< 25.4	< 35.7	< 13.3	< 26.0	< 23.2	< 27.8
Copper (MG/L)	28800	24300	15100	52400	22600	34900	18700
Lead (MG/L)*	<101	< 99.1	<139	150	< 101	146	153
Nickel (MG/L)	91.0	119	179	215	110	85.9	69.0
Zinc (MG/L)	4910	4170	4330	5760	3810	4910	3710
	9.02	9.04	5.92	15.78	8.32	9.81	7.83

Parameter	# 8	# 9	# 10
Aluminum (MG/L)	53200	55100	51200
Chromium (MG/L)	11400	6430	15900
Cadmium (MG/L)	< 9.90	< 22.8	< 18.2
Copper (MG/L)	4540	13200	30100
Lead (MG/L)	113	155	125
Nickel (MG/L)	48.5	77.4	111
Zinc (MG/L)	2920	3470	3620
	25.09	9.88	13.89

All results have been corrected for percent solids.
*All concentrations have been corrected for Aluminum interference.
See reverse side for "STANDARD CLAUSES".

ppm 1 gram put in 100 mls of water = Volume

/disk 25

APPROVED: Lisa A. Seeley

Former Hulett Lagoon Site
Combined PA/SI
Reference 27

JOHN ASHCROFT
Governor

FREDERICK A. BRUNNER
Director

Division of Energy
Division of Environmental Quality
Division of Geology and Land Survey
Division of Management Services
Division of Parks, Recreation, and Historic Preservation

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176
Jefferson City, MO 65102

May 26, 1988

The Honorable Mac Webster
Mayor of Camdenton
112 Court Circle, P.O. Box 1048
Camdenton, MO 65020

Re: IDG - 011 Camdenton, MO
Lagoon Closure

Dear Mayor Webster:

This letter is to explain what options are available for the City to pursue in order to completely abandon and close the Huelett or Factory Lagoon. We have reviewed the sludge sample analysis which your engineer sent to us on April 25, 1988 and May 20, 1988. The first step before you assess each option is to determine the percent moisture and the sludge depth at each sample site and to use the information to calculate the total weight of each of the various metals.

There are several options available to the City which are briefly explained below.

Option 1

Dispose of the sludge on site, at the lagoon. This option will require the preparation of a solid waste disposal area permit application complete with plans and specifications. The Waste Management Program would then review the application to determine if it could issue the permit. A point of contact for additional information and the time requirements of this option would be Mr. Tom Gredell at 751-3176.

Option 2

Haul sludge to a permitted, sanitary landfill. This would require a Special Waste Disposal Request. The sludge must also have no "free liquid" in order to be properly handled. A copy of the special waste disposal request form is enclosed. Tom Gredell would be your contact person as in option #1.

Option 3

Surface application in accordance with the Missouri Sludge Guide, "Agricultural Use of Municipal Wastewater Sludge" (Table 4).

This would require the preparation and approval of a sludge management plan. The plan would limit the rate at which sludge could by applied. The rate would be based upon limiting the weight of metals to be applied to allow the unrestricted use of the land in the future. You should contact Ken Arnold at 751-6624 for additional information.

Option 4

Sub-surface application at the maximum one time rate. This would require either injecting the liquid sludge with chisel plows under the soil surface, or spreading the sludge, discing and then plowing the field. The rate of application would be higher than in option #3, but could not exceed the maximum cumulative site loadings per the Sludge Guide. This option would require the site to be City owned and the site would be restricted for use as a sludge disposal site in the future. Ken Arnold would be your contact person as in option #3.

Please note that what ever option is used, the lagoon must not discharge to the creek unless the City receives a new operating permit. The lagoon currently doesn't have a discharge permit. Preferably, any discharge would be to the City's sewer and be tested for compliance with the City's pretreatment ordinances before being introduced to the sewer.

We suggest you work closely with your engineer to quickly resolve the fate of the sludge disposal and lagoon abandonment. Please note the grant cannot be closed and final reimbursement made until this work is complete. If you should have any questions, please do not hesitate to call me at 751-6619.

Sincerely,

WATER POLLUTION CONTROL PROGRAM

David Freise, P.E.
Project Engineer

DF/pa

cc: Jefferson City Regional Office
Missouri Engineering Corporation

Former Hulett Lagoon Site
Combined PA/SI
Reference 28

JOHN ASHCROFT
Governor

G. TRACY MEHAN III
Director

Division of Environmental Quality
Division of Geology and Land Survey
Division of Management Services
Division of Parks, Recreation,
and Historic Preservation

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176
Jefferson City, MO 65102

November 2, 1989

The Honorable Mac Webster
Mayor of Camdenton
112 Court Circle, P.O. Box 1048
Camdenton, MO 65020

Re: IDG-011 Huelett Lagoon

Dear Mayor Webster:

I recently visited the above referenced lagoon site and the temporary sludge storage site at the city airport. During my visit, I noted a berm was not yet in place around the temporary storage to prevent solids run off. This is a condition of the approval issued February 22, 1989. The city administrator, Kent Hixson, stated the berm would be in place as soon as possible.

I would also like to remind you the approval is valid for only one year. Therefore, the sludge spreading must be completed in accordance with the plan and approval letter by February 22, 1990.

Thank you for your consideration in these matters and please thank Kent Hixson for me for the time he spent with me that day.

Sincerely,

WATER POLLUTION CONTROL PROGRAM

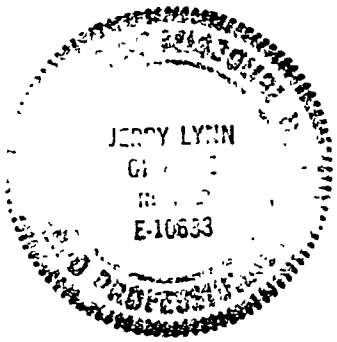
David Freise, P.E.
Project Engineer

DF:mle

cc: Jefferson City Regional Office
City Administrator, Kent Hixson
Missouri Engineering Corporation

Former Hulett Lagoon Site
Combined PA/SI
Reference 29

SPECIFICATIONS
AND
CONTRACT DOCUMENTS
REMOVAL AND STOCKPILING OF
SLUDGE FROM THE HULETT LAGOON
CAMDENTON, MISSOURI



March, 1989

MISSOURI ENGINEERING CORPORATION
211 HWY. 63 SOUTH
ROLLA, MISSOURI

TABLE OF CONTENTS

Advertisement for Bids	
Information for Bidders	IB-1 - IB-3
Proposal Form	PF-1 - PF-4
Bid Bond	BB-1 - BB-2.
Bidders Qualifications & Subcontracting	BQ-1
Certificate of Owners's Attorney	
Agreement	A-1 - A-4
Performance Bond	PB-1 - PB-2
Payment Bond	PAB-1 - PAB-2
General Conditions	GC-1 - GC-21
Supplemental General Conditions	SGC-1 - SGC-21
Technical Specifications	1 - 4
Location Map	Appendix I
Sludge Disposal Sites	Appendix II
Access Road & Storage Facility	Appendix III
Hulett Lagoon Location	Appendix IV
Airport Location	Appendix V
Sludge Analysis Report	Appendix VI

Missouri Engineering Corporation
ENGINEERING CONSULTANTS
P O BOX 13
ROLLA, MISSOURI 65401 • PHONE 314-364-4003

April 18, 1989

REMOVAL AND STOCKPILING OF
SLUDGE FROM THE HULETT LAGOON
CAMDENTON, MISSOURI

ADDENDUM NO. 1

This project to be bid May 2, 1989, at 1:30 p.m.

Item No. 1. Bidders are hereby notified of a pre-bid conference at City Hall, Camdenton, Missouri, at 1:00 p.m., April 26, 1989.

MISSOURI ENGINEERING CORPORATION

Charles Ray

Received By:

Ronald A McCormick

5/22/89
Date

INFORMATION FOR BIDDERS

BIDS will be received by City of Camdenton, Missouri

(herein called the "OWNER"), at City Hall, Camdenton, Missouri

until 1:30 PM, May 2, , 19 89 , and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to City Clerk, City Hall, at Camdenton, MO 65020. Each sealed envelope containing a BID must be plainly marked on the outside as BID for Removal and Stockpiling of Sludge from the Hulett Lagoonand the envelope should bear on the outside the BIDDER's name, address and license number if applicable, and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at City Hall, Camdenton, Missouri.

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or type written, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required. Tied bids will not be considered by the OWNER.

The OWNER may waive any informalities or minor defects or reject any and all BIDS. Any BID may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 90 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

ADVERTISEMENT FOR BIDS

CITY OF CAMDENTON, MISSOURI
(Owner)

Separate sealed bids for Camdenton Sludge for Removal and Stockpiling of Sludge from the Hulett Lagoon will be received by Brenda Colter, City Clerk at the office of City Hall, Camdenton, Missouri 65020 until 1:30 o'clock (~~XX~~M. - P.M., ___S.T. X D.S.T.) May 2, 1989, and then at said office publicly opened and read aloud.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications, and Forms of Bid Bond, Performance and Payment Bond, and other contract documents may be examined at the following:

City Hall, Camdenton, Missouri 65020

Missouri Engineering Corporation

211 Hwy. 63 South, Rolla, MO 65401

Copies may be obtained at the office of Missouri Engineering Corporation located at 211 Hwy. 63 South, Rolla, MO 65401 upon payment of $10.00 for each set. Any plan holder, upon returning such set promptly and in good condition, will be refunded $-0-.

The owner reserves the right to waive any informalities or to reject any or all bids.

Each bidder must deposit with his bid, security in the amount, form and subject to the conditions provided in the Information for Bidders.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and and minimum wage rates to be paid under the contract, Section 3, Segregated Facility, Section 109 and E.O. 11246.

No bidder may withdraw his bid within 30 days after the actual date of the opening thereof.

Date

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve the contractor from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a BID bond payable to the OWNER for five percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A performance BOND and a payment BOND each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or payment BONDS and performance BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND and payment BOND within fifteen (15) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary Agreement and BOND forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may consider the BIDDER in default, in which case the BID BOND accompanying the proposal shall become the property of the OWNER. Upon default by the first low BIDDER the AWARD may then be made to the next lowest responsible BIDDER, or the WORK may be readvertised for a construction CONTRACT or otherwise, as the OWNER may decide.

The OWNER upon receipt of an acceptable performance BOND, payment BOND, Certificate of Insurance, and AGREEMENT signed by the party to whom the AGREEMENT was awarded, shall within a reasonable period of time sign the AGREEMENT and return to such party an executed duplicate of the AGREEMENT. The OWNER upon signing the AGREEMENT and within a reasonable period of time shall issue the NOTICE TO PROCEED.

The OWNER may make such investigations as deemed necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID

if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the Agreement and to complete the WORK contemplated therein.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest responsive, responsible BIDDER, based on the total base bid for the work described in the proposal form.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to its BID.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the equal opportunity clause set forth in the SUPPLEMENTAL GENERAL CONDITIONS.

The low BIDDER shall supply the names and addresses of major material SUPPLIERS and SUBCONTRACTORS when required to do so by the OWNER.

The A/E is Missouri Engineering Corporation. The A/E's address is 211 South Highway 63 South, Rolla, Missouri 65401.

The Bidder agrees by the submission of his bid that he will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, or sex in connection with the performance of work under this bid and/or contract.

PROPOSAL FORM

TO: City Council
Camdenton, Missouri

The UNDERSIGNED BIDDER, having examined the plans, specifications, general and special conditions and other proposed contract documents attached hereto and referred to herein, and any and all addenda thereto; the location, arrangement, and construction of existing railways, streets, roads, structures and facilities which affect or may be affected by the proposed work, the topography and condition of the site of the work, and having acquainted with and fully understanding (a) the extent and character of the work covered by this Proposal; (b) the location, arrangement and specified requirements of and for the proposed new structures and miscellaneous items or work appurtenant thereto; (c) the nature and extent of the excavations to be made and the type, character, and general condition of the materials to be excavated; (d) the necessary handling and rehandling of excavated materials; (e) all existing and local conditions relative to construction difficulties and hazards, labor, transportation, hauling, trucking, and rail delivery facilities; and (f) all other factors and conditions affecting or which may be affected by the specified work.

HEREBY PROPOSES to furnish all required materials, supplies, equipment, tools, and plant; to perform all necessary labor; and to construct, install, erect, and complete all work stipulated in, required by, and in accordance with, the proposed contract documents hereto attached and the plans and other documents referred to therein (as altered, amended, or modified by and all addenda thereto) at the prices stated below.

Bidder hereby agrees to commence work under this contract on or before date to be specified in written "Notice to Proceed" of the Owner and to fully complete the project within: 60 Consecutive Calendar Days

Removal and Stockpiling of Sludge from the Hulett Lagoon

Bidder further agrees to pay as liquidated damages the sum of $100.00 for each consecutive calendar day thereafter as hereinafter provided in the General Conditions.

Bidder agrees to perfrom all the work as described in the specifications and as shown on the plans for the following prices.

REMOVAL AND STOCKPILING FROM THE HULETT LAGOON

Item No.	Description	Estimated Quantity	Unit Price	Extension
1.	Lagoon Dewatering by Pumping	50 Hrs.	$ 36.50	$ 1,825.00
2.	Lime added to Sludge, Complete	100 Tons	$ 14.60	$ 1,460.00
3.	Discing of Sludge	40 Hrs.	$ 43.25	$ 1,730.00
4.	Sludge Removal from Lagoon and Stockpiling, Complete	1500 Cu Yds	$ 7.73	$ 11,595.00
5.	Site Work at Stockpile Site	L.S.	$	2,920.00
		TOTAL	$	19,530.00

Listed above is the revised proposal form including unit prices and then extensions. This proposal form was revised due to excluding unit prices in the original bid; however the total remains the same. I agree to the above unit prices, extensions and total and agree to perform the work described above for these prices.

Ronald A. McCormick, Owner
McCormick Gravel & Excavating

5/6/89
Date

It is mutually understood and agreed by and between the parties of this contract, in signing the agreement thereof, that time is of the essence in this contract. In the event that the Contractor shall fail in the performance of the work specified and required to be performed within the period of time stipulated therefor in the Contract Agreement binding said parties after due allowance for any extension of time which may be granted under provisions of the preceding paragraph, the Contractor shall pay unto the Owner, as stipulated liquidated damages and not as a penalty the sum stipulated therefor in the Proposal, for each and every calendar day that the Contractor shall be in default.

Liquidated damages will be waived for any period of time covered by a time extension granted by the Owner.

In the case of joint responsibility for any delay in the final completion of the work covered by this contract, where two or more separate contracts are in force at the same time and cover work on the same project and at the same site, the total amount of liquidated damages assessed against all contractors under such contracts, for any one day of delay in the final completion of the work, will not be greater than the approximate total of the damages sustained by the Owner by reason of such delay in completion of the work, and the amount assessed against any Contractor for such one day of delay will be based upon the individual responsibility of such Contractor for the aforesaid delay as determined by and in judgment of the Owner.

The Owner shall have the right to deduct said liquidated damages from any moneys in its hand, otherwise due, or to become due, to said Contractor, or to sue for and recover compensation for damages for non-performance of this contract at the time stipulated herein and provided for.

The undersigned hereby agrees to enter into contract on the attached contract forms and furnish the necessary bond and evidence that insurance of the kind and minimum limits specified is in force within ten days from the date of your acceptance of this proposal, to begin assembly of materials and equipment within ten days from receipt of executed copies of the contract and to complete said work within the indicated number of consecutive calendar days from and after the date of receipt from the Owner of a written work order.

If this proposal is accepted, and should (I) (We) for any reason fail to sign the contract within ten days, as above stipulated, the deposit which has been this day made with the Owner shall at the option of the Owner be retained by the Owner as liquidated damage for the delay and expense caused the owner but otherwise it shall be returned to the undersigned in accordance with the provisions set forth in Information for Bidders.

I have ____, have not ✓, participated in a previous contract, subject to the provisions of Section 301 of Executive Order 11246, as amended.

I have ____, have not ✓, submitted required compliance reports under such previous contracts.

DATED AT _____ this 2nd day

of May, 19 89.

SIGNATURE:

If an individual: Ronald A McCormick doing business as

McCormick Gravel & Excavating

If a Partnership: _____

By _____ Member of the Firm

If a Corporation: _____

By _____

Title _____

ATTEST: _____
Secretary

(CORPORATE SEAL)

Business Address of Bidder RR 2 Box 193E

Versailles, Mo 65084

If Bidder is a corporation, supply the following information:

State in which incorporated _____

Name and Address of its:

President _____

_____

Secretary _____

_____

BIDDERS QUALIFICATIONS & SUBCONTRACTING

To evaluate the bidders' qualifications for acceptance on this project, the Owner requests the following:

a. Previous Experience (Projects of similar construction detail)

Location	Year	Type	Mat'l Type & Size	Approx. Bid
Lake of the Ozarks	1989	Dredging	5520 yd. mud + gravel 6" + under	$6500
Lake of the Ozarks	1989	Dredging	1500 yd mud + gravel 6" + under	$2500
Lake of the Ozarks	1989	Dredging	1500 yd mud + gravel 6" + under	$2500
Lawrie, MO	1989	construct pond	50 yd. X 100 yd. X 6 ft. dirt + rock	$5000

b. List of Equipment available for this job:

John Deere 690B Excavator
Caterpillar 955H Dozer/Loader
2 Dump Trucks (Tandem) John Deere tractor
500 gal water wagon with pump, 2" pump - Disc

c. List of subcontractors contemplated for this job:

(Name)	(Type of Work)
Carl Miller	Dump truck

This report is an integral part of the proposal.

Date 5/2, 19 89.

By Ronald G Tuckermick

Title Owner

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned, _____, the duly
(Print)
authorized and acting legal representative of _____
_____, do hereby certify as follows:

I have examined the foregoing contract(s) of _____
(Contractor)
_____ and surety bonds and the manner of
execution thereof, and I am of the opinion that each of the aforesaid agreements have been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof. In addition, I have examined the Certificate of Insurance for amounts and coverages per the requirements of the General Conditions/Supplemental General Conditions of the contract documents and find that adequate insurance is in full force and effect.

Dan Twehl
Project Attorney

6/5/89
Date

Address:

AGREEMENT

THIS AGREEMENT, made this 6TH day of JUNE, 19 89,

by and between City of Camdenton, Missouri, hereinafter called
(name of Owner), (~~an individual~~)

and McCormick Gravel & Excavating doing business as (an individual),

or (a ~~partnership~~), or (a ~~corporation~~) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements herein after mentioned:

1. The CONTRACTOR will commence and complete the construction of

REMOVAL & STOCKPILING FROM THE HULETT LAGOON.

2. The CONTRACTOR will furnish all of the materials, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the PROJECT described herein.

3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within 3 calendar days after the date of the NOTICE TO PROCEED and will complete the same within 60 calendar days unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.

4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of

Nineteen thousand five hundred thirty and 00/100 Dollars $ 19,530.00.

5. The term "CONTRACT DOCUMENTS" Means and includes the following:

(A) Advertisement for BIDS

(B) Information for BIDDERS

(C) BID

(D) BID BOND

(E) Agreement

(F) General Conditions

(G) SUPPLEMENTAL GENERAL CONDITIONS

(H) Payment BOND

(I) Performance BOND

(J) NOTICE OF AWARD

(K) NOTICE TO PROCEED

(L) CHANGE ORDER

(M) DRAWINGS prepared by _____

numbered _____ through _____, and dated _____,

(N) SPECIFICATIONS prepared or issued by _____

Missouri Engineering Corporation

dated March, 19 89.

(O) ADDENDA:

No. 1, dated April 18, 19 89

_____, _____, 19_____

_____, _____, 19_____

_____, _____, 19_____

_____, _____, 19_____

_____, _____, 19_____

6. The OWNER will pay to the CONTRACTOR in the manner at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized officials, this Agreement in (4) copies each of which shall be deemed an original on the date first above written.

OWNER:

CITY OF CAMDENTON, MISSOURI

By Mac Webster

Name Mac Webster
(Please Type)

Title Mayor

(SEAL)

ATTEST:

Brenda Colter

Name Brenda Colter
(Please Type)

Title City Clerk

CONTRACTOR:

McCORMICK GRAVEL & EXCAVATING

By Ronald A. McCormick

Name Ronald A. McCormick
(Please Type)

Address R. R. 2, Box 193E

Versailles, MO 65084

Employer Identification Number:

42-1311948

(SEAL)

ATTEST:

✓ Danny L. Grupe

Name Danny L. Grupe
(Please Type)

expires 4-14-90

TECHNICAL SPECIFICATIONS

General	Page 1
Lagoon Dewatering	Page 1
Sludge Removal & Stockpiling	
A. Preparation	Page 2
B. Transportation	Page 3
C. Stockpiling	Page 3
Basis of Payment of Sludge Removal	Page 4

GENERAL

The Contractor shall provide the services, equipment and all appurtenances for the removal and stockpiling of the existing wastewater sludge located within the Hulett Lagoon. This lagoon has been eliminated as a part of the city's sewer system with construction of new sewer lines. The lagoon's primary contributor was a metal tubing company and hence, the metals content in the sludge accumulated in the lagoon is of a higher than normal concentration. Test results of samples taken of the sludge are given as an appendix to this report. The locations of the lagoon and the stockpiling area are also given in the appendices. The contractor's responsibility will be to stockpile the sludge at the site provided in accordance with the following specifications.

1. LAGOON DEWATERING: The Contractor shall pump the existing water from the lagoon and discharge it into the existing sewer manhole approximately 100 feet away, see Appendix I. The Contractor shall make all provisions as provided to prevent any solids to be discharged into the sewer system. The lagoon presently has 6" to 12" of water standing in the bottom with the sludge. The contractor shall dewater the sludge to at least a condition where the sludge will cake. The expected solids content is 12 to 15 percent. The contractor will be allowed to construct a sump pit in one of the lower parts of the lagoon. This pit must be of seal tight construction such as metal or fiberglass. This sump can be placed in an area where the sludge has been removed and down to an elevation of approximately 18" depth. The upper portion of the sump shall be provided with screens having mesh wire to prevent

solids easy access to the sump. When the sump has been placed the outer edges shall be backfilled and sealed so as to prevent leakage around the sump box. This will be done by compacting the soil backfill into the excavated areas. The contractor shall be paid for this work at an hourly rate while the pump is in operation. The pump or pumps used shall not exceed a total of 200 GPM into the sewer system. The contractor has sole responsibility for insuring that the dewatering is directly pumped into the sewer line.

2. SLUDGE REMOVAL & STOCKPILING:

A. PREPARATION

The Contractor shall remove as much of the concentrated sludge from the cell as possible without excavating into the soils of the floor. This may be accomplished with a high lift or other piece of equipment as selected by the contractor. If the sludge is not suitable for removal using these methods, after dewatering and normal evaporation, the contractor may add lime and/or disc the sludge to assist in the drying. The proposal form provides for unit costs for these items but will not be paid for unless prior approval is obtained from the city.

After the contractor has removed as much of the sludge as possible from the cell bottom, then upon approval of the Engineers, a pit may be excavated to allow for collection of the remaining sludge. This will only be allowed in an area where tests can be performed to insure proper soils conditions will prevent seepage.

B. TRANSPORTATION

The Contractor shall load the sludge into a truck capable of a liquid tight performance. A rubber seal, gasket, or sealant material between the tailgate and the bed and a bed cover shall be required to pervent leakage of sludge materials from the truck while in transit to the stockpile location. All trucks shall be inspected prior to leaving the site to insure that seepage is not occuring. The contractor is totally responsible for cleaning up any seepage or spills that occur in any area between the two sites.

The Contractor shall provide a water tank or other means, at the stockpile site, to allow the trucks to be cleaned on the exterior of the bed, should accumulation cause for spillage on the return trips.

C. STOCKPILING

The stockpiling site is located approximately 150 linear feet from the county road. The Contractor shall provide his own access to the stockpile area at the location designated. The Contractor shall provide clearing, install culverts, crushed stone, etc. as necessary for his operations.

Before stockpiling begins, the contractor shall plow 2 furrows around the site, except for the area on the higher side, needed for truck access to the area. These furrows shall be sufficient to prevent drainage from the site. The area to be encompassed is approximately 160 feet in diameter.

The sludge shall be stockpiled to a height of no more than 2 feet.

The Contractor shall level the sludge after is is dumped from the trucks as necessary so as to normally maintain this height of less than 2 feet. This could be accomplished once daily.

This access road as provided by the contractor shall remain in place after the contractor's work has been completed.

BASIS OF PAYMENT OF SLUDGE REMOVAL

The sludge was checked for the thickness of the layer at varying points in the lagoon. Two piles of up to 18" thickness are located at each of the inlet pipes. The remainder of the cell is covered with sludge ranging basically in thickness from 6" to 12". The amount of sludge to be removed has been shown on the proposal form at 1500 cubic yards. Actual quantities are believed to be less. Final payment will be based on the actual amount of sludge removed and stockpiled having at least a 12% solids content. The size and number of trucks shall be recorded showing the total trips of each. This shall be used to determine the actual quantity removed. If discrepancies are encountered in the size and number of loads, then the stockpile area shall be guided as a cross check. This will all be done with a member of the construction crew present.

SECTION 1 CALCULATIONS

I. Determination of Acreage for Sludge Disposal

A. Limitations

1. Maximum cumulative copper limit of 500 bls./acre
2. Camdenton Airport
   a. Field No. 1 25.0 acres
   b. Field No. 2 17.4 acres

B. Conversion Factors

1. 1 MG/L = 1 ppm
2. Weight of water = 62.4 lbs/cu ft
3. Weight of lagoon sludge = 1.2 x weight of water
   = (1.2) (62.4) = 74.88 lbs/cu ft

C. Information from Test Reports and References

1. Average metal analysis for ten copper samples = 24,464 MG/L

D. Calculation of Acreage Using DNR Guidelines

1. Total sludge limit of copper in dry tons/acre

a.

Metal	ppm			lbs./dry ton
Cu	24,464	x	0.002 =	48.928

b.

(1) Cumulative Metal Limits	(2) Sludge Metal	(3) Total Sludge Limit dry tons/acre
lbs./acre	lbs/dry ton	col. 1 ÷ col. 2
500	48.928	10.219
250	48.928	5.1095

2. Weight of Dry Sludge

Quanity of Sludge = 1250 cu yd % Solid of Sludge = 20%

$$\frac{(1250 \text{ cu yd})\ (27 \text{ cu ft/cu yd})\ (0.2)\ (74.88 \text{ lbs/cu ft})}{2000 \text{ lbs/ton}} = 253 \text{ Dry Tons}$$

3. Field No. 1 (25.0 acres) accepts a Cumulative Metal Limit of 500 lbs/acre. Apply 164 tons to Field No. 1. The 164 tons will be dispensed on 16.1 acres.

   Field No. 2 (17.4 acres) accepts a Cumulative Metal Limit of 250 lbs/acre. Apply 89 tons to Field No. 2. The 89 tons will be dispensed on 17.4 acres.

II. Acidity Warrents Liming of the Disposal Site

A. Limitations

1. Disposal site should have a pH value of 6.0

B. Information from Test Reports

1. Field No. 1 & 2 at the Camdenton Airport has a Enm requirement of 4330 and 2195 respectively.

2. To determine the amount of limestone needed in tons/acre divide the ENM requirement by the guarantee of the limestone dealer.

C. Procedure for obtaining pH of 6.0

1. Apply lime to disposal site before applying the sludge

2. Disc lime into field before applying the sludge

3. Have soil samples taken to verify an acquired pH of 6.0.

III. Dewatering, Storage and Disposal of Sludge

A. Limitations

1. The sludge will be transported by a dump truck with the means to protect leakage or spillage of the sludge.

B. Information from Test Reports

1. On May 16, 1988 the sludge contained an average of 11.5% soild.

C. Procedure

1. Dewatering of sludge should occur by removal of liquids and Natural evaporation. Discing and Liming sludge maybe used to assist coagulation.

2. Transport sludge by dump truck to a designated storage area at the Camdenton Airport.

3. Precautions should be taken to contain the sludge while stock-piled. A berm will be necessary around the temporary storage site at the airport to contain any run-off.

4. A Dry Sludge Applicator should be used to apply th sludge onto Field No. 1 & 2.

Note:

1. The sludge must be thoroughly mixed before being land applied due to the variability of the metals concentration throughout the lagoon as shown by the sample report dated April 19, 1988.

2. Percent solids concentrations must be run daily on the sludge when it is being applied to ensure the loading rate can be calculated as the application progresses.

3. Upon completion of the work, a summary must be submitted to the Department of Natural Resources.

SECTION 2 REFERENCES

1. Agricultural Use of Municipal Wastewater Sludge - A Planning Guide
   Missouri Department of Natural Resources
   Division of Environmental Quality
   January 1985

2. Process Design Manual for Dewatering Municipal Wastewater Sludges
   U. S. Environmental Protection Agency
   Office of REsearch and Development Municipal Environmental Research Laboratory
   October 1982 EPA - 625/1-82-014

Metal Limitations

See Table 4 for maximum recommended heavy metal loadings. The metals listed in Table 4 are those which are most common in domestic sludges. For other industrial contributors See Table 4-A and contact the Department for any other parameters. Calculate which is the most limiting metal and the number of years to reach the limit at the proposed application rate. A sample worksheet is provided (Appendix B-1).

ppm metal x .002 = lbs. metal per dry ton

TABLE 4
Maximum Cumulative Amounts of Heavy Metals
Recommended for Privately Owned Farmland

Metal	kg/ha (pounds/acre in parenthesis) Soil Cation Exchange Capacity (meq/100 g soil)		
	CEC 0 - 5	CEC 5 - 15	CEC 15 +
Cadmium	5 (4.5)	10 (9)	20 (18)
Chromium	560 (500)	1120 (1000)	2250 (2000)
Copper	140 (125)	280 (250)	560 (500)
Lead	560 (500)	1120 (1000)	2250 (2000)
Nickel	140 (125)	280 (250)	560 (500)
Zinc	280 (250)	560 (500)	1120 (1000)

APPENDIX B-2 SLUDGE WORKSHEET - CONSERVATIVE MANAGEMENT

Facility _____ Address _____ Date _____

STEP 1 - LAB DATA (see page 27)

A) SLUDGE ANALYSIS (Expressed on dry solids basis)

	ppm		lbs/dry ton
Total Kjeldahl Nitrogen	_____	x .002 =	0
Cadmium (Cd)	41		0
Chromium (Cr)	17,053		26.106
Copper (Cu)	24 967		48.928
Nickel (Ni)	112.58		0.225
Zinc (Zn)	4,161		8.322
Other	64,720		129 940
Other Solids	_____ ppm ÷ 10,000	=	_____ %

B) SOIL TEST ANALYSIS (See Page 13)

pH _____ Limestone needed _____ ENN

Cation Exchange Capacity (CEC) _____ me

STEP 2 - CROP AND SITE INFORMATION (See Page 23 & 24)

Previous Crop _____

Future Crop _____

Slope _____ % Buffer Areas _____ Feet from _____

Geologic Restrictions _____

Pathogen Reduction _____

Cattle Grazing _____

Other _____

Location _____ 1/4, Sec _____, Twp _____, Rge _____, County _____

STEP 3 - APPLICATION RATE

150 lbs/acre Total N ÷ _____ lbs Total N per dry ton of sludge (Step 1) = _____ * dry tons/acre/year of sludge.

* For surface application the maximum rate is 2 dry tons.

STEP 4 - METALS EVALUATION

A) SLUDGE APPLICATION RATE _____ tons/acre/year from Step 2 or Step 3 or lower selected rate.

B) METALS ADDITIONS (See Page 17 & 18)

METAL	(1) CUMULATIVE METAL LIMITS LBS/ACRE (Table 4)	(2) LBS METAL PER DRY TON SLUDGE (Step 1)	(3) TOTAL SLUDGE LIMIT DRY TONS/ACRE (Col 1 ÷ Col 2)	(4)* METALS APPLIED PER YEAR LBS/ACRE (Col 2 x Step 4A)
Cd	18	0	-	_____
Cr	2000	26.106	76.611	_____
Cu	500	48.928	10.219	_____
Ni	500	0.225	2222.222	_____
Zn	1000	8.322	120.163	_____
Other	_____	_____	_____	_____

* Column 4 should not be more than 10-15 % of Column 1.

Cu Most Limiting Metal (lowest in Column 3)

10.219 Dry Tons/Acre Total Sludge Limit (lowest Column 3)

C) SITE LIFE FOR METALS LOADING

_____ Dry Tons/Acre Total Sludge Limit (Step 4B)

- _____ Dry Tons/Acre Sludge Applied Previously

- _____ Dry Tons/Acre Sludge Remaining to Reach Metal Limit

÷ _____ Dry Tons/Acre/Year Sludge Application (Step 4A)

= _____ No. Years To Reach Metals Limits

ENVIRODYNE ENGINEERS

12161 Lackland Road
St. Louis, Mo. [illegible]
[illegible]

REPORT OF ANALYSIS

CLIENT: Valda Mahoney
Missouri Engineering
Post Office Box 13
Rolla, MO 65401

REPORT DATE: April 19, 1988
SAMPLE ANALYZED: Ten sludge samples for metals analysis.

DATE RECEIVED: March 7,1988
PROJ. #: 3222-00353 P.O. #:

Parameter	# 1	# 2	# 3	# 4	# 5	# 6	# 7
Aluminum (MG/L)	55700	67400	97000	89300	79200	47100	52000
Chromium (MG/L)	12400	24300	28900	19000	24300	12300	15600
Cadmium (MG/L)	< 26.0	< 25.4	< 35.7	< 13.3	< 26.0	< 23.2	< 27.8
Copper (MG/L)	28800	24300	15100	52400	22600	34900	18700
Lead (MG/L)#	<101	< 99.1	<139	150	< 101	146	152
Nickel (MG/L)	91.0	119	179	215	110	85.9	89.0
Zinc (MG/L)	4910	4170	4330	57e0	3810	4910	3710

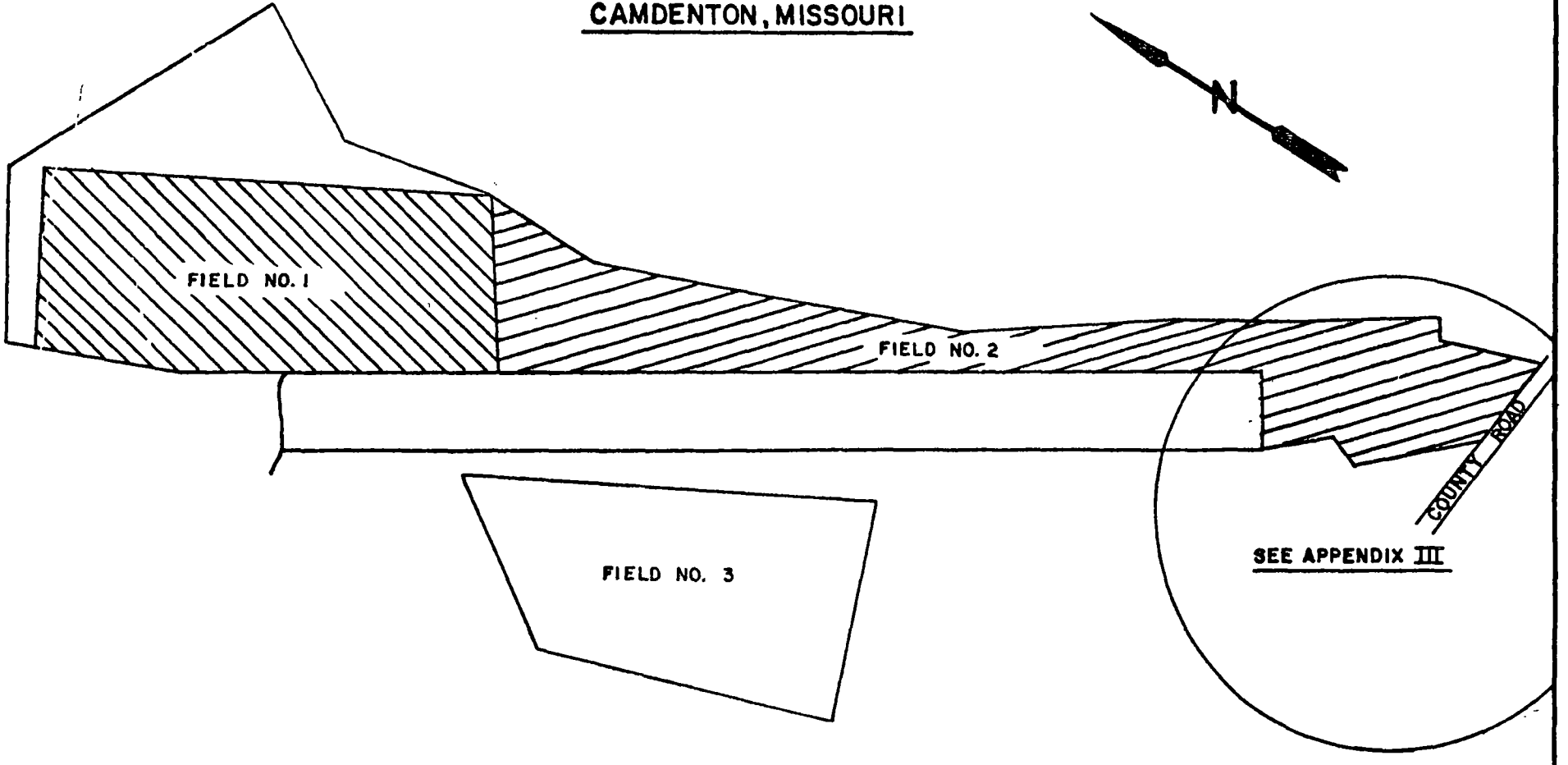
Parameter	# 8	# 9	# 10
Aluminum (MG/L)	55200	55100	51200
Chromium (MG/L)	11400	6430	15900
Cadmium (MG/L)	< 9.50	< 22.8	< 18.2
Copper (MG/L)	4340	13200	30100
Lead (MG/L)	113	155	125
Nickel (MG/L)	46.5	77.4	111
Zinc (MG/L)	2920	3470	3e20

All results have been corrected for percent solids.
#All concentrations have been corrected for Aluminum interference.
See reverse side for "STANDARD CLAUSES".

/dlsl 25

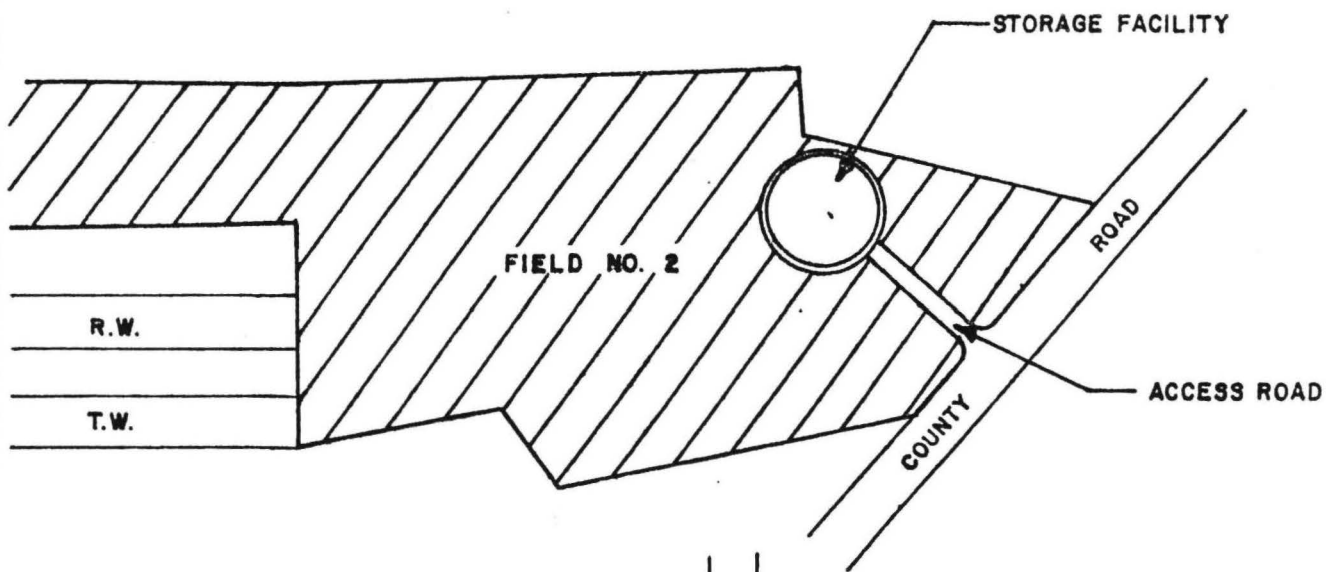
APPROVED: Lisa A. Lesley

SLUDGE DISPOSAL SITES
CAMDENTON, MISSOURI

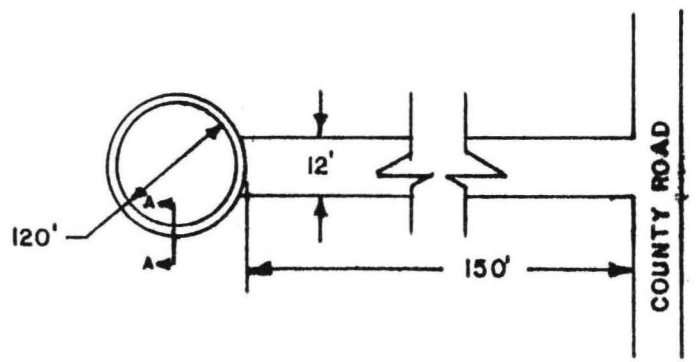


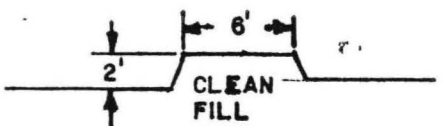
NOTE: FIELD NO. 2 AND PART OF FIELD NO 1 TO BE USED FOR DISPOSAL.

MISSOURI ENGINEERING CORP CONSULTING ENGINEERS ROLLA, MISSOURI		
DRAWN BY	SCALE NONE	DRAWING NO
CK'D BY	APP'D DATE	APPENDIX II







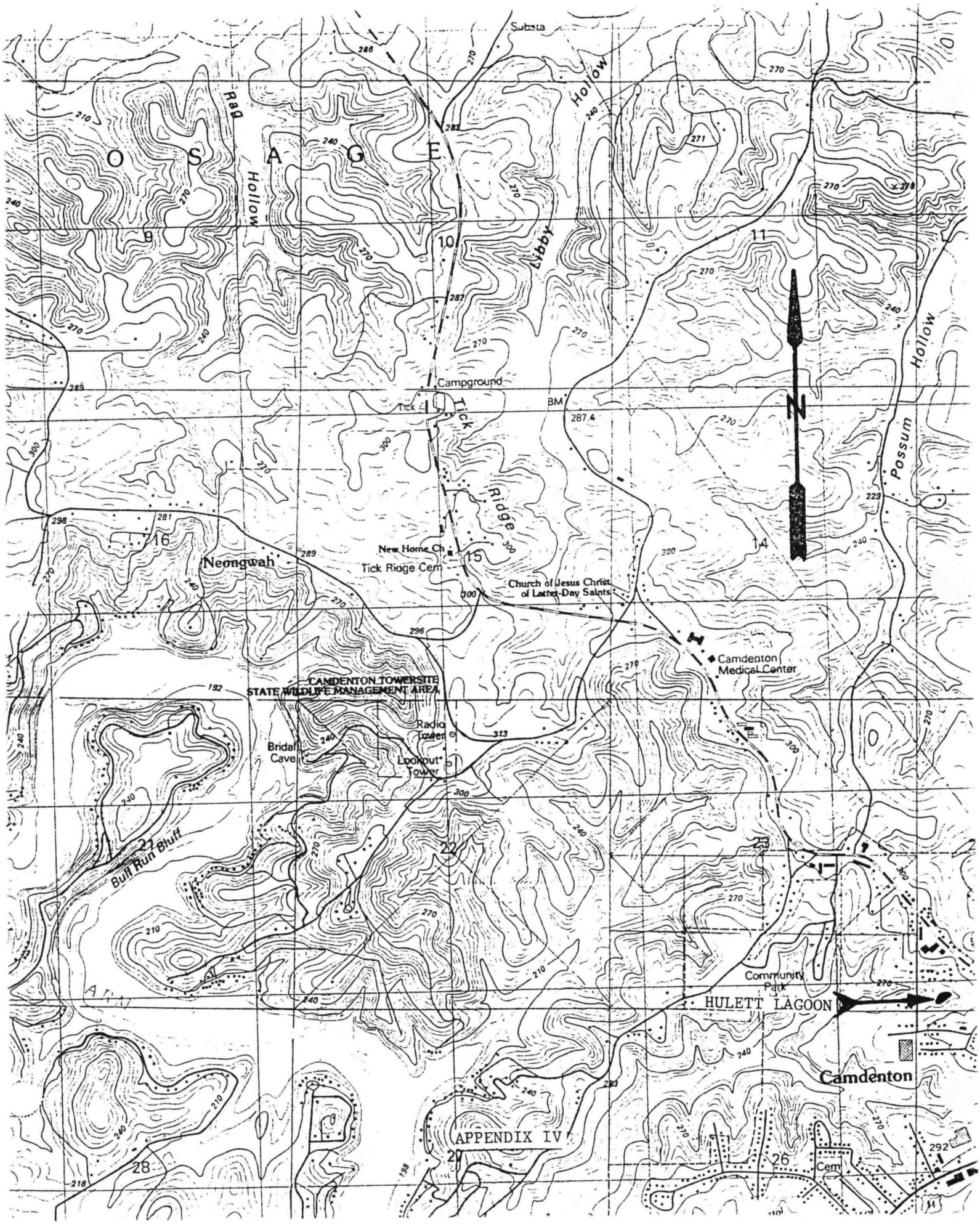


SECTION A-A

ACCESS ROAD & STORAGE FACILITY

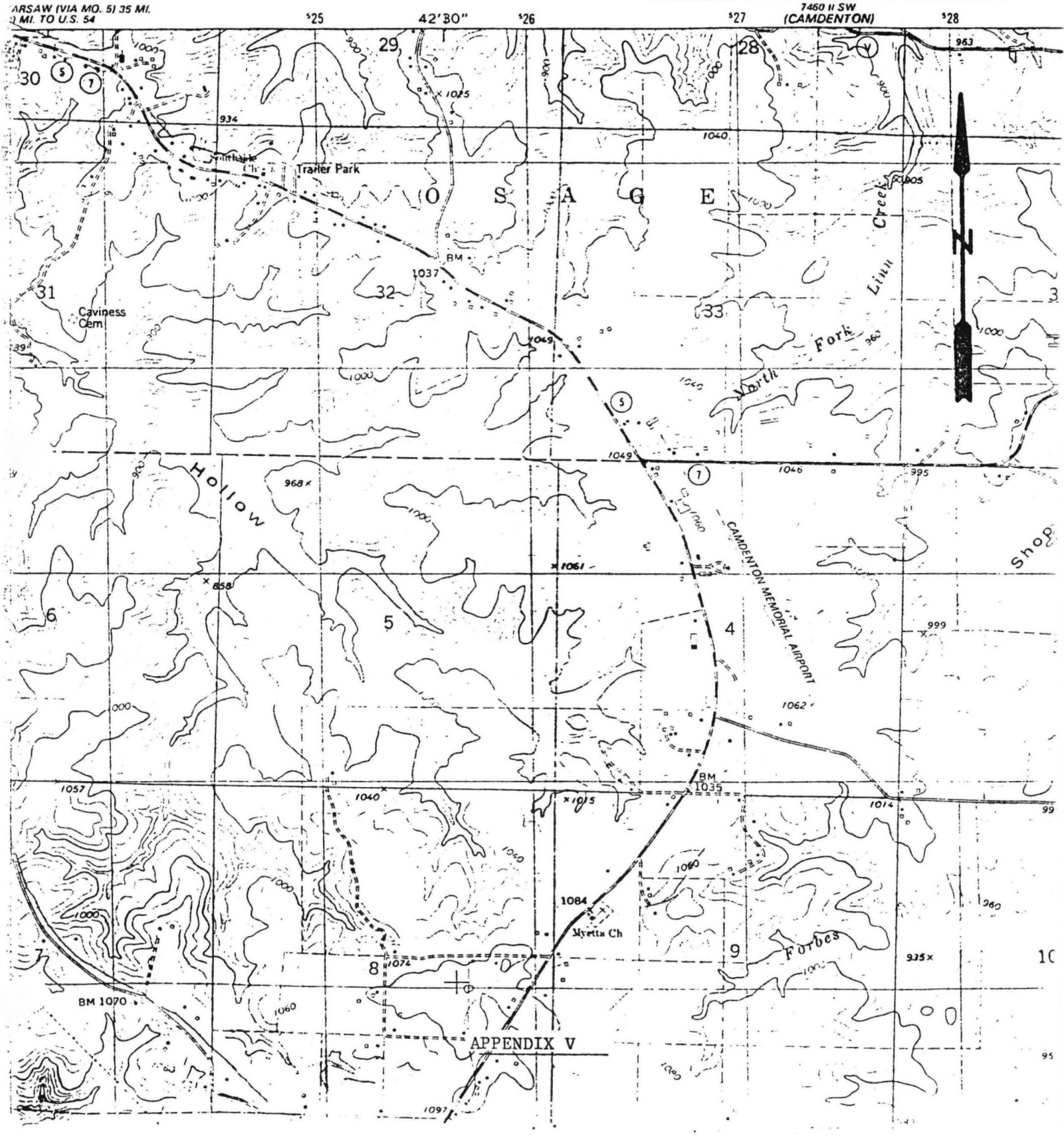
APPENDIX III

MISSOURI ENGINEERING CORP. CONSULTING ENGINEERS ROLLA, MISSOURI		
DRAWN BY	SCALE 1"= 200'	DRAWING NO.
CK'D. BY	APP'D. DATE	APPENDIX III


O S A G E
Substa
Rag Hollow
Hollow
Libby
Campground
Tick
Tick Ridge
BM
287.4
Possum Hollow
New Home Ch
Tick Ridge Cem
Neongwah
Church of Jesus Christ of Latter-Day Saints
Camdenton Medical Center
CAMDENTON TOWERSITE STATE WILDLIFE MANAGEMENT AREA
Radio Tower
Bridal Cave
Lookout Tower
Bull Run Bluff
Community Park
HULETT LAGOON
Camdenton
APPENDIX IV
Cem

OR

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
WALLACE B. HOWE, STATE GEOLOGIST



APPENDIX V

ENVIRODYNE ENGINEERS

REPORT OF ANALYSIS

CLIENT: Valda Mahoney
Missouri Engineering
Post Office Box 13
Rolla, MO 65401

REPORT DATE: April 19, 1988
SAMPLE ANALYZED: Ten sludge samples for metals analysis.

DATE RECEIVED: March 7,1988
PROJ. #: 3222-00353 P.O. #:

Parameter	# 1	# 2	# 3	# 4	# 5	# 6	# 7
Aluminum (MG/L)	55700	67400	97000	89300	79200	47100	52000
Chromium (MG/L)	12400	24300	28900	19000	24300	12300	15600
Cadmium (MG/L)	< 26.0	< 25.4	< 35.7	< 13.3	< 26.0	< 23.2	< 27.8
Copper (MG/L)	28800	24300	15100	52400	22600	34900	18700
Lead (MG/L)*	<101	< 99.1	<139	150	< 101	146	153
Nickel (MG/L)	91.0	119	179	215	110	85.9	89.0
Zinc (MG/L)	4910	4170	4330	5760	3810	4910	3710

Parameter	# 8	# 9	# 10
Aluminum (MG/L)	53200	55100	51200
Chromium (MG/L)	11400	6430	15900
Cadmium (MG/L)	< 9.99	< 22.8	< 18.2
Copper (MG/L)	4540	13200	30100
Lead (MG/L)	113	155	125
Nickel (MG/L)	48.5	77.4	111
Zinc (MG/L)	2920	3470	3620

All results have been corrected for percent solids.
*All concentrations have been corrected for Aluminum interference.
See reverse side for "STANDARD CLAUSES".

ppm 1 gram put in 100 mls of water = Volume

/disk 25

APPENDIX VI
Page 1

APPROVED: Lisa A. Lesley

PAGE 1 OF 1

Missouri Engineering Corporation
ENGINEERING CONSULTANTS
P O BOX 13
ROLLA, MISSOURI 65401 • PHONE. 314-364-4003

Former Hulett Lagoon Site
Combined PA/SI
Reference 30

July 21, 1989

SLUDGE REMOVAL PROJECT
HULETT LAGOON - CAMDENTON, MO

Mr. Ron Macormic approached me concerning the spreading of the sludge on the 22 acre area at the airport. This sludge is currently being stockpiled.

His proposal is basically as outlined below.

1. Spreading of sludge complete - $2.25 per cu. yd.
   We have estimated this at 1500 cu yc. or $3375.00.

2 Clearing, bush-hogging, or cutting to be able to utilize the area. May be up to 4 acres.
   His proposal is $400 per acre or $1600.00

3 Discing of the field after sludge application to create a mixture and seed bed.
   A lum sum cost of $560 00.

4. For seeding of the 22 acre tract with 15 lbs per acre of fescue and 1 bushel per acre of cover crop at a cost of $45.00 per acre or a total of $990.00.

Based upon our estimated quantities, this would create a change order increase of a total of $6525.00. If you wish to pursue this method of completing the disposal, please let me know.

MISSOURI ENGINEERING CORP.

Charles Ray
CR/lc

Attachment A

Contractor's
Change Order No. 1

City of Camdenton, Missouri (Owner) of Camden State of Missouri County,

To McCormick Gravel & Excavating for REMOVAL & STOCKPILING HULETT LAGOON Section of Project

You are hereby directed to make the following changes from the contract

1. Description, location and reason for change of each item and effect on completion date. (Attach additional sheets if required)

Spreading stockpiled sludge on the 22 acre area at the airport. See Attachment A. Time extension due to poor weather conditions

2. Cost of work affected by this change order.

Item No.	Item Description	Units Provided for	Units To Be Built	Units Add or Deduct	Contract or Unit Price	Amount Added	Amount Deducted
	Spreading Sludge	0	1500	+ 1500	2 25	3,375.00	
	Clearing & bush-hogging	0	4	+ 4	400 00	1,600 00	
	Discing	0	1	+ 1	LS	560 00	
	Seeding	0	22	+ 22	45 00	990.00	
	30 day time extension -- Completion date revised to September 9, 1989.						
				Totals		6,525.00	

1. Contract Amount $19,530 00
2. Add or Deduct this Change Order (Additions - Deductions) + $6,525 00
3. Add or Deduct Previous Change Orders 0
4. Total Add or Deduct to Date + $6,525 00
5. Adjusted Contract Amount $26,055 00

Engineer Date 8/14/89 Contractor Date 8/15/89

Owner Date

Contractor's
Change Order No. 2

City of Camdenton, Missouri (Owner) of Camden State of Missouri County,

To McCormick Gravel & Excavating for REMOVAL & STOCKPILING HULETT LAGOON Section of Project

You are hereby directed to make the following changes from the contract

1. Description, location and reason for change of each item and effect on completion date. (Attach additional sheets if required)

Time extension due to inclement weather.

2. Cost of work affected by this change order.

Item No.	Item Description	Units Provided for	Units To Be Built	Units Add or Deduct	Contract or Unit Price	Amount Added	Amount Deducted
45	day time extension -- Completion date revised to October 24, 1989 NO COSTS INVOLVED						
				Totals			

1. Contract Amount $19,530 00
2. Add or Deduct this Change Order (Additions - Deductions) 0
3. Add or Deduct Previous Change Orders + $6,525 00
4. Total Add or Deduct to Date + $6,525 00
5. Adjusted Contract Amount $26,055 00

James T. Kilmac 9/5/89
Engineer Date

Ronald A. McCormick 9/19/89
Contractor Date

Owner Date 9/25/89

Contractor's
Change Order No. 3

City of Camdenton, Missouri (Owner) of Camden State of Missouri County,

To McCormick Gravel & Excavating for Removal & Stockpiling Hulett Lagoon Section of Project

You are hereby directed to make the following changes from the contract

1. Description, location and reason for change of each item and effect on completion date. (Attach additional sheets if required)

2. Cost of work affected by this change order.

Item No.	Item Description	Units Provided for	Units To Be Built	Units Add or Deduct	Contract or Unit Price	Amount Added	Amount Deducted
	Removal of excess soils to complete lagoon abandonment	0	1	+1	LS	7,000 00	
	Adjustment for spreading of materials at airport for clearing brush, spreading sludge and soils, discing, and seeding	0	1	+1	LS	1,363 50	
				Totals			

1. Contract Amount 19,530.00
2. Add or Deduct this Change Order (Additions - Deductions) + $8,363.50
3. Add or Deduct Previous Change Orders + $6,525 00
4. Total Add or Deduct to Date + $14,888 50
5. Adjusted Contract Amount $34,418 50

Engineer Date 11/30/87

Contractor Date

Owner Date

Former Hulett Lagoon Site
Combined PA/SI
Reference 31

Attached herewith you will find a letter dated November 01 1989 written to Attorney David Welch from Charlie Ray with Missouri Engineering Corporation, along with the Information for Bidders, Proposal Form, additional information for the contractor, and Change Order Nos 3 and 4 concerning the sludge removal at the Hulett Lagoon.

I personally inspected the sludge site at the airport with Kent and Charlie on Wednesday, October 25, 1989. Upon our inspection, it was found that there is soil that was removed from the lagoon, but there are traces of sludge mixed in with the soil.

I will be the first to admit that I am by far no expert on sludge, but is my feeling that if sludge was present at the lagoon, that it should be removed. This being not only to satisfy my concerns, but maybe more importantly, to satisfy DNR. I believe you will agree that we do not want any trouble with DNR over this lagoon sludge removal.

I realize the Mayor or Council was not advised of the additional loads being removed from the lagoon at the time, but let's just suppose we had been told beforehand that additional loads needed to be removed. . .then, would we have said no? Would we have been expert enough to know that no more sludge needed to be removed from the lagoon? Please just take a minute and think about it.

As Charlie states in his letter, weather conditions were not ideal at the time sludge was being pumped from the lagoon, and there were delays, plus each time the rains came, this caused the sludge to spread back over the area of the lagoon, which I feel would need to be removed. Apparently, the contractor felt it necessary to remove the additional soil, as it was contaminated with sludge Although, after the sludge was removed and taken to the stockpile sight and dried out, the majority removed was soil, BUT there was a percentange of sludge in the soil that was tested.

Charles also states that more tests can be performed on the soil at the stockpile sit, but you will note that the eight tests that were run cost $1000.00. Do we want to keep testing the soil and spending thousands of dollars for this?

You will note in the information attached to Charlie's letter, on page GC-20 under No. 30 ARBITRATION, that disputes will be settled by arbitration. Although, some of you may not be too familiar with arbitration, I deal with it everyday in my work, and it has been my experience that this is not the easiest way to prove a point. You may think your case is airtight, but the arbitration committee can easily blow your case right out of the water. I personally believe that if the arbitration committee saw that there was a percentage of sludge in the excess soil removed from the lagon, that they would rule in favor of the contractor Be advised this is my personal opinion, but also, I have dealt with arbitration committees for several years. Our attorney may disagree with me totally, but I do feel very strongly on this point.

I feel we can sit in the council chambers and argue and hash this matter out for several hours, and never settle the dispute. As you know, each of us are separate individuals with our own way of thinking. I am not trying to persuade any one of you in any way, but please take a little time and think carefully about this matter and just maybe, you may reconsider allowing this matter to be resolved by paying the contractor on these change orders.

I do have information from a very reliable and trustworthy individual that McCormick has alread been told that an additional $3000 00+ that he has spent on this sludge removal project will not be taken into consideration for payment, and they have apparently accepted this fact

This matter can be discussed to some extent Tuesday night, but let's not drag it out for any length of time Please be advised that I do intend to make a motion for this additional money to be paid to McCormick and it will be up to the rest of the council to either agree or disagree Remember, in the meantime, the sludge is just sitting idle at the airport waiting to be spread

Thank you for taking the time to read this and reconsidering all the facts involved in this matter

Again, I respect each and everyone of you in the decisions we make as a council, and I do feel that we are a strong and aggressive council who face may tough decisions each time we sit in the council chambers

Sincerely,

Kay Cyrus

Missouri Engineering Corporation
ENGINEERING CONSULTANTS
P O BOX 13
ROLLA, MISSOURI 65401 • PHONE. 314-364-4003

November 1, 1989

Dave Welch
Attorney at Law
190 Court Circle
Camdenton, MO 65020

Dear Dave:

Since our meeting Tuesday morning, I have tried to summarize the overall situation of payment on the Hulett Lagoon Sludge Removal and Stockpiling project. I have taken a set of the contract documents and marked what I felt was pertinent information regarding this matter. Mr. McCormick feels that he is due additional funds for sludge removal. I am in agreement with him that he has removed additional material but disagree that it was actually sludge.

The specifications were very clear that the quantities shown were only estimates and that final payment would be made on the quantities actually removed and measured. On GC-8, 13.1, it states that final measurements shall not be considered changes in the work. It also states in the specifications that differing site conditions or weather conditions can govern the work to be performed and paid for. This project is very unique and the conditions encountered during the removal period were not ideal. As you are aware, the Department of Natural Resources had complete control on the approval of this material being removed, but it was at a total cost paid by the City of Camdenton.

The scope of the project included complete removal of the sludge from the lagoon site and stockpiling of this material at the south end of the airport property. I have had conversations with Mr. McCormick over concerns of the project and will try to highlight those in the following statements.

1. I have been told that even though the contractor was prepared to begin removal of the sludge during the last weeks of June, that he was told by the city to not start until after the July 4th holiday period. We lost two weeks of very favorable working days.

2. The removal process began on July 11, 1989. They had hauled approximately 650 cubic yards through July 12 at 1:30 p.m. At that time my inspector told me that they were way less than one-half done with the area. I asked how much dirt was being removed with the sludge. Was it a clean separation? The answer was that the excavation was being made to a level that showed clay material. I asked my inspector to have Mr. McCormick to contact me.

3. Mr. McCormick called me to discuss the problems. He assured me that there was very little dirt being removed and absolutely no more than was necessary. I told him at that time, that if there was going to be more sludge, I had to take the increase to the council. His statement was that he felt that the total yardage would not exceed the 1500 cubic yards in the proposal by very much, maybe a hundred yards.

4. The sludge was left to dry after July 12. Rainfall filled the bottom of the lagoon during the following weeks and created additional pumping. The contractor attempted removal again on August 18 and 19. Rain again stopped the project on August 19.

5. After pumping on the lagoon again and drying the sludge, the contractor again started hauling on September 7 and 8. When work had stopped on August 19, I was advised by my inspector that they were nearly done and if it had not rained, they would have probably finished that day. They were at approximately 1485 cubic yards. After the rains and the contractor continued, he hauled approximately another 910 cubic yards.

In my opinion and as shown at the lagoon site, much of the soils were contaminated with copper each time the lagoon was refilled with rainwater. The reason this showed was because the copper settled out and oxidized causing the soils to appear as the same color of the sludge. Each time the contractor reworked the areas, he was forced to remove additional materials that must have appeared to be sludge when it was wet. After it dried at the stockpile site, it was obvious to me that most of it was soils. The test results that we had performed reflect that this is actually the case.

In eight samples taken from the stockpiled materials, an analysis was made to determine the sludge quantity. These are as follows:

1. 3.08% sludge
2. 0.37% sludge
3. 1.05% sludge
4. 1.53% sludge
5. 8.10% sludge
6. 33.35% sludge
7. 1.68% sludge
8. 2.03% sludge

Also the metals test show a considerable drop from the sludge samples analyzed before the project began. Concentrations of copper dropped from a high of 50,000 parts per million to a high of 5500 parts per million.

It is impossible to test every particle of the stockpiled materials to determine if this is totally representative, but I believe that is is a valid comparison. There are approximately 50 loads that would have to be tested to get an actual sludge analysis. These eight tests cost $1000.

I know that the council feels as if they were left out of this decision, but I do not think that they could have ever reached any other answer other than to continue to remove all necessary materials. This has always been the goal in order to satisfy DNR requirements.

It is my opinion, that the contractor did the work required in order to achieve the completion of the total sludge removal and should be compensated for the additional material removal in the amount of $7,826.50. In addition to this, if we continue with the project and spread the material at the airport, there would be an additional cost of $1,800 to spread the additional materials.

Hopefully this information will be of benefit to you. I would certainly like to see this issue resolved and the project completed.

Sincerely,

MISSOURI ENGINEERING CORP.

Charles Ray

Charles Ray
CR/vm

Former Hulett Lagoon Site
Combined PA/SI
Reference 32
10/20/89

Mr. Hixson + Council Members.

This letter is in regard to the cost overrun involved in the Hulett Lagoon Project.

I was in constant contact with Missouri Engineering at all stages of the job. There was an inspector on the job at all times. Missouri Engineering was well informed of all additional work necessary to complete the job, including additional pumping, extra lime + more sludge to be removed than Missouri Engineering's estimate. I was assured it was not a problem because I was to be paid by the yard for the removal.

I also want to add that I was told that if there was less than 1500 yards of sludge, I would be paid less. If there was more, I would be paid more. I accepted both possibilities as I assured the council did

As you all know, the weather posed a problem, with an unusual frequency of rainfall. This was no one's fault but it did not allow the sludge to shrink down as it dried the way it should have This kept the bottom of the lagoon soft, making it impossible to prevent getting a small amount of

mud along with the sludge. At no time was more removed than was absolutely necessary in order to get all the sludge out.

At the bid opening for this job, I said in the presence of Mrs. Ray, the mayor & the past city administrator that I knew there was a lot more than 1500 yards of sludge in there. The yardage was discussed with Missouri Engineering numerous times and I was always assured it was no problem.

My bid was quite fair. I did not "create" an overrun for my benefit. It would have been to my benefit if there had been only 1500 yards.

The prices I submitted for spreading the sludge, I believe you will also find very reasonable. But, again, all prices are unit prices.

I will attend the November 7 meeting & hope to help clear up any questions as best I can.

Sincerely,

Ron McCormick

Former Hulett Lagoon Site
Combined PA/SI
Reference 33

City of Camdenton

112 Court Circle P O Box 1048
Camdenton MO 65020
314-346-3600

Ronnie Testerman
Department of Natural Resources
P O Box 176
Jefferson City, Mo 65102

April 9, 1990

RE Hulett Lagoon Sludge Disposal
Work Completion Summary

Dear Ronnie,

As per the approved sludge disposal plan for this project, I am submitting to DNR a work completion summary The following is a chronological recounting of the events surrounding the project

January 1989 The fields at the airport were limed in order to improve the pH levels to 6

June, July, August 1989 The contractor mixed the sludge with lime in the lagoon and transported it to the storage site at the airport Rain delays and traffic considerations added to the length of time needed for this work

December, 1989 After allowing it to dry, the contractor began spreading the material via dry sludge applicator on the designated fields at the airport, mixing it with additional soil and discing the sludge into the ground Soils tests were taken to insure the loading rate did not exceed set limits Rain and snow delayed completion of the spreading

March, 1990 Mixing, spreading and discing were completed Soils test were taken and demonstrated that the loading was below the specified levels The fields have been seeded with a mix of Timothy and Fescue grasses in order to provide ground cover and prevent erosion

April, 1990 The fields that are below a pH level of 6 will be limed to bring them up as needed

I hope that this summary statement fulfills the requirements of the approved sludge disposal specifications Should you have any questions or require further information, please feel free to contact me

Your cooperation and assistance in helping the city is very much appreciated

Sincerely,

Kent L Hixson

Kent L Hixson

Former Hulett Lagoon Site
Combined PA/SI
Reference 34

City of Camden

112 Court Circle P O Box 1048
Camdenton MO 65020
314-346-3600

Mr Paul Kieler
Jacobs Engineering Group
10901 W 84th Terrace
Suite 210
Lenexa, Kansas 66214

March 23, 1992

RE Hulett Lagoon Clousre Process

Dear Mr Kieler,

Enclosed are some documents relevant to the closing of Hulett Lagoon This is the sewer lagoon that Modine, formerly Sunstrand, discharged into The lagoon was built in 1962-63 and was taken out of service in 1986-87 after Sunstrand constructed the pre-treatment facility

The actual lagoon closure wasn't completed until late 1989 I had only recently been hired by the City and was not involved in the development of the closure plan

I do know that all the sludge was taken to the municipal airport and land applied then tilled into the soil according to the DNR guidelines The berms of Hulett lagoon were turned in and mixed with on a 1 to 1 ratio

The City is in the process of leveling off the site and opening it up for a neighborhood park

If you have any questions or require further information, please feel free to contact me

Sincerely,

Kent L Hixson
City Administrator

Former Hulett Lagoon Site
Combined PA/SI
Reference 35

PRELIMINARY ASSESSMENT
SUNDSTRAND
CAMDEN COUNTY, MISSOURI

January 31, 1992

Missouri Department of Natural Resources
Hazardous Waste Program

Prepared By:

John Madras,
Environmental
Specialist

Reviewed By:

Jim Belcher,
Chief
Planning and Pre-
Remedial Unit

Approved By:

Edwin D Knight,
Chief
Superfund Section

Date: January 31, 1992

Prepared by: John Madras
Missouri Department of Natural Resources

Site: Sundstrand
City of Camdenton, Camden County, Missouri

EPA ID No.: MOD

1. INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Missouri Department of Natural Resources, through a cooperative agreement with the U.S. Environmental Protection Agency, conducted a Preliminary Assessment (PA) at the Sundstrand site. The purpose of this investigation was to collect information concerning conditions at the site sufficient to assess the threat posed to human health and the environment, and to determine the need for addition investigation under CERCLA/SARA or other action. The scope of this investigation included review of available file information, a comprehensive source survey, a comprehensive target survey, and an on-site reconnaissance.

2. SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERISTICS

2.1 Location

The Sundstrand site is located in the City of Camdenton, Missouri, at the center of Camden County, Missouri (Figure 1). The geographic coordinates are 38° 00' 32.5''N latitude and 92° 45' 26''W longitude (Reference 1). The site is located about one-half mile west of the intersections of U S. Route 54 and Missouri Route 5/7. The site can be accessed by turning west onto Sunset Drive from Missouri Route 5/7.

Camden County is characterized by a temperate climate. Summers are warm and humid with daily temperatures reaching 90°F or higher. The winter months are generally cold with normal daily temperatures of 22° to 42°F. Net annual precipitation for the area is 42 inches (Reference 2, pages 1, 13, 43).

2.2 Site Description

The suspected area of contamination includes soil beneath the manufacturing facility, and soil and fill material comprising loading areas and parking lot adjacent to the facility on the west (Reference 3,4) Trichloroethylene (TCE) and 1,1,1-trichloroethane (TCA) have been detected in the soil below the facility and in borings in the adjacent areas outside of the facility (Reference 5) Groundwater may be affected.

Concentrations of TCE and TCA detected at the facility are shown on Figure 2 (from Reference 5)

The facility is located on a gently, sloping terrain which drops steeply toward a permanently flowing tributary of Lake of the Ozarks.

The Sundstrand site appears to be the sole source of potential TCE or TCA contamination in the vicinity of the site itself. Other potential sources are present in the Camdenton area (Reference 6; Electrovert USA site).

Sundstrand was an interim status hazardous waste treatment, storage, and disposal facility (EPA ID# MOD06249351). The Department requested a Part B application to be submitted. The facility was sold to Modine Heat Transfer, Inc , a wholly owned subsidiary of Modine Manufacturing Company. The new owner stated their intention to complete the closure begun by Sundstrand and operate the facility as a "generator only" facility (Reference 7).

Wastewater from the facility was discharged to the City of Camdenton sanitary discharge system. At the time of the alleged release, that discharge was delivered to the City's "Factory" lagoon. This lagoon was subsequently closed and discharges were transferred to the City's new wastewater treatment facility

2.3 Operational History and Waste Characteristics

To date, no governmental agencies have conducted sampling at this site. Routine water well sampling has been conducted for the City of Camdenton wells, the closest of which is about 200 feet from the site. No contamination was detected (Reference 8).

Modine Heat Transfer, Inc., the present owner and operator of the facility, expressed an interest in conducting sampling following a meeting with the Department of Natural Resources on March 11, 1991 (Reference 9). A sampling plan was submitted; however, it was not approved (Reference 10).

After one revision of the plan, the owner decided to proceed without approval by the Department (Reference 11). Sampling was conducted October 5-8, 1991, without approval of the plan or oversight of the sampling by the U S Environmental Protection Agency or the state.

No removal actions or other response actions have occurred at the site.

3 GROUNDWATER PATHWAY

3.1 Hydrogeologic Setting

The following information is reported from the Missouri Division of Geology and Land Survey (Reference 12)

The bedrock at the site is the Roubidoux Formation The surficial materials developed overlying the bedrock are composed of stratified layers of hard, broken chert and sandstone fragments in red, silty clay

Beds of massive boulders, some over three feet thick are not uncommon This residuum is three to nine feet thick

The area is underlain by a thick sequence of Ordovician and Cambrian aged rocks The sequence is primarily dolomite, and may be up to 1,800 feet thick The section that includes the principle aquifers through the Potosi Dolomite is uninterrupted by a consistent confining bed This part of the section is approximately 1,000 feet thick, and is made up of dolomites except for the Roubidoux Formation, which contains intervals of dolomitic sandstone, and the Gunter Sandstone Member of the Gasconade Dolomite Though some units in this sequence may act as relative confining layers, the entire section from the Potosi Dolomite up through the Roubidoux formation should be considered one aquifer

The Davis Formation contains the only persistent confining shale bed in the section It serves as a boundary between the lower part of the Cambrian sequence, and the Potosi and stratigraphically higher formations Vertical circulation of water has enlarged openings along joints and fractures, allowing freer passage of water from the surface through the Potosi Dolomite

There are no major geologic structures in the target area to constitute an aquifer discontinuity There are also no topographic features which transect an aquifer within the target area

The aquifer underlying the site is a karst aquifer Karst features are particularly well developed in the Roubidoux Formation, which is the uppermost bedrock beneath the site Segments of the unnamed stream downgradient from the site are losing

3 2 Groundwater Targets

The majority of the population within a 4-mile radius relies on public water supplies, either the City of Camdenton or one of the other public water supplies The Camdenton public water supply is a blended system that draws water from three wells All three wells are within one mile of the site, and together they serve the population of 2,561 (Reference 13) Sampling of the City of Camdenton wells in 1987 and 1991 did not detect contamination by the hazardous substances of concern at this site (Reference 8)

In addition, there are many other public water supply wells located in the vicinity of the site, including the wells for the City of Linn Creek (see Table 1) There are approximately 374 homes within four miles which use private wells for drinking water (Reference 1) At 2 4 persons per household (the average for Camden County, Reference 14), this equates to 898 residents

The residence using a private well and located closest to a suspected source of the contamination is about 3,700 feet from the western side of the Modine plant. No residences relying on private wells are located within a 0.25-mile radius of this potential source (Reference 1).

All water wells in the area produce from the same aquifer. Most of the lake homes, restaurants, condominiums, and subdivisions have private water supplies, as there are no rural water districts in the area. There is no wellhead protection area in the vicinity of the site.

3.3 Groundwater Conclusions

A release of hazardous substances to the Cambro-Ordovician aquifer is possible through the on-site disposal of solvents. TCE has been detected in area springs in the vicinity of the site, although dye trace work in the Camdenton areas has not been successful in identifying the recharge area of the spring. Due to the relatively high conductivity of the aquifer, potential widespread migration of contaminants is high. There are no residents whose wells are within 0.25 mile of the potential source. TCE and TCA are very mobile contaminants and the direction of groundwater flow is unknown. As no well contamination has been detected in wells close to the site, the remainder of residents dependent upon private wells within four miles are considered to be secondary targets.

4. SURFACE WATER PATHWAY

4.1 Hydrologic Setting

The site is located near the divide between two small branches of an unnamed stream which drains west to the Niangua Arm of the Lake of the Ozarks. Water appears to run off the site to the south and southwest. There are no runoff containment structures on-site. Discharge from the drainage pipe on the west side of the parking lot runs through an excavated area and into a well defined gully west of the site The two drainage pipes on the south side of the facility do not appear to ever discharge large quantities of water since there is no channel leading from the pipe. The site is less than one-half mile southwest of the divide between the Linn Creek drainage and the Niangua River drainage. The two-year 24-hour rainfall for the site is 3.5 inches.

Drainage from the site flows overland to the south and southwest down a steep slope for approximately 700 feet before it enters an unnamed stream, which flows southwest to the Lake of the Ozarks. This unnamed stream contains losing segments The drainage area of the site is less than 50 acres The site is not located in a floodplain

Since this is a karst area, water issuing from springs within the groundwater target area should be considered for the surface water pathway. This would

include Ha Ha Tonka Spring and an unnamed spring near the City of Linn Creek TCE has been previously detected in Ha Ha Tonka Spring

4 2 Surface Water Targets

The unnamed tributary is a permanently flowing water body at the probable point of entry of contaminants from the site (Reference 1) This tributary is not a classified stream in the Missouri Water Quality Standards It is subject to the general criteria for protection of all waters of the State of Missouri (Reference 15, page 11) Lake of the Ozarks, into which this unnamed creek flows, is classified for the protection of livestock and wildlife watering, the protection of warm water aquatic life and human health/fish consumption, whole body contact recreation, and boating and canoeing (Reference 15, page 32)

There are no identified drinking water intakes in the vicinity of the site

There are no identified wetlands in the vicinity of the site There are sensitive environments present in the vicinity of the site (References 16, 17), although they do not occur in surface waters

4 3 Surface Water Conclusions

There are no present indications that hazardous substances have been released into surface waters or into areas that drain toward permanently flowing surface waters The waters of the unnamed tributary appear to be recharged at least partially from shallow groundwater, which is suspected to be contaminated There are no water intakes located on the tributary or on the Lake of the Ozarks No identified wetlands are present in the vicinity of the site A federally designated endangered species, as well as other sensitive environments, are present in the vicinity of the site Primary targets include the fisheries of the tributary and Lake of the Ozarks, and the sensitive environments

5 SOIL EXPOSURE AND AIR PATHWAYS

5 1 Physical Conditions

At this point, no areas of surface soil contamination have been identified Hazardous substances have been detected at shallow depths in parking areas west of the building, and in soil below the floor of the building (the pit under the vapor degreaser)

5 2 Soil and Air Targets

The potential source of the contamination is an active facility Residences are located on properties adjacent to the facility The residence nearest any of the potential sources is located about 200 feet from the former west wall of

the facility (the alleged disposal area). There are 808 residences located within 0.25 mile of this location. The Modine property is fenced with a gate at the road entrance The total population within a 4-mile radius of the lagoon is 6,394 (Reference 14).

There are no wetlands of at least five acres in the vicinity of the site Smaller wetlands may be present. The Gray Bat (Myotis griesescens) is federally and state listed as endangered. The bat is known from four caves in the vicinity of Camdenton. The first cave is 2 1 miles from the site. Spinulose shield fern (Dryopteris carthusiana) is known to occur in the vicinity of the site in Red Sink Natural Area and is state listed endangered. Other sensitive environments are also present in the vicinity of the site (References 16 and 17).

5.3 Soil Exposure and Air Pathway Conclusions

The soil exposure pathway appears to pose a minimal threat at the site due to the inaccessibility of the closest potential source. Although TCE is volatile when exposed to air, a release of TCE to air is not suspected because of the length of time since releases were alleged to have occurred. In addition, many of the sites are covered with pavement, buildings, or vegetation.

6. SUMMARY AND CONCLUSIONS

The Sundstrand site is located in the City of Camdenton, Missouri, at the center of Camden County, Missouri (Figure 1). The site is located about one-half mile west of the intersections of U.S. Route 54 and Missouri Route 5/7 The suspected area of contamination includes soil beneath the Modine Heat Transfer (formerly Sundstrand) manufacturing facility, and soil and fill material comprising loading areas and parking lot adjacent to the facility on the west. The contaminants are known to include trichloroethylene (TCE) and 1,1,1-trichloroethane (TCA). Due to the relatively high conductivity of the aquifer, potential widespread migration of contaminants is high There are no residents whose private wells are within 0.25 mile of the potential source TCE and TCA are very mobile contaminants and the direction of groundwater flow is unknown There are no present indications that hazardous substances have been released into surface waters or into areas that drain toward permanently flowing surface waters. There are no water intakes located on the tributary or on Lake of the Ozarks No identified wetlands are present in the vicinity of the site. Primary targets include the fisheries of the tributary and Lake of the Ozarks, a federally designated endangered species, and other sensitive environments The soil exposure pathway appears to pose a minimal threat at the site due to the inaccessibility of the closest potential source.

REFERENCES

1 U S Geological Survey, 7 1/2 minute topographic quadrangle maps showing site location (Green Bay Terrace, Camdenton, Decaturville, Ha Ha Tonka)

2 The Climatic Atlas of the United States, U S Department of Commerce, 1983

3 Original complaint

4 Former employee's statement

5 Law Environmental, Inc report

6 CERCLIS, Camden County sites

7 MDNR hazardous waste files Hazardous Waste Registrations, Modine correspondence of 12/3/90 and 12/10/91, Sundstrand correspondence of 9/6/90

8 MDNR sampling results

9 Record of Modine/MDNR meeting

10 MDNR comment letter on sampling plan

11 Modine letter stating that it would proceed with sampling

12 Edith Starbuck, Missouri Division of Geology and Land Survey, Memorandum, 1/13/92

13 Phone call with Rick Hixson, 1/24/92

14 Census Bureau, 1990 data

15 Missouri Water Quality Standards, 10 CSR 20-7 031

16 Dan Dichkneite, Missouri Department of Conservation, letter dated 9/6/91

17 Jerry Brabender, U S Fish and Wildlife Service, letter dated 9/16/91

Sundstrand PA
January 31, 1992

TABLE 1

GROUNDWATER TARGETS

Public Water Supplies

City of Camdenton #3 (Rodeo): total depth 940 feet; cased depth 450 feet; aquifer Cambrian-Ordovician; capacity 320 gpm; distance from site 1.0 miles population served 622.

City of Camdenton #4 (Blair): total depth 1045 feet; cased depth 400 feet; aquifer Cambrian-Ordovician; capacity 300 gpm; distance from site 0 6 miles; population served 576.

City of Camdenton #6 (Mulberry): total depth 900 feet; cased depth 400 feet; aquifer Cambrian-Ordovician; capacity 575 gpm; distance from site 08 miles; population served 1105.

City of Linn Creek #1: total depth 385 feet; cased depth 170 feet; aquifer Cambrian-Ordovician; capacity 100 gpm; distance from site 2.9 miles; population served ___.

City of Linn Creek #2: total depth 860 feet; cased depth 528 feet; aquifer Cambrian-Ordovician; capacity 50 gpm; distance from site 3 1 miles; population served ___.

Camden PWSD #2: total depth 848 feet; cased depth 330 feet; aquifer Cambrian-Ordovician; capacity 100 gpm; distance from site 4 0 miles; population served ___.

Autumn Village: cased depth 260 feet; aquifer Cambrian-Ordovician; capacity 50 gpm; distance from site 1.4 miles; population served ___.

Camdenton Medical Center: total depth 1.3 feet; cased depth ___ feet; aquifer Cambrian-Ordovician; capacity ___ gpm; distance from site 1.4 miles; population served ___

Camdenton Windsor Estates: total depth 600 feet; cased depth 400 feet; aquifer Cambrian-Ordovician; capacity 140 gpm; distance from site 1 5 miles; population served ___

Cape of the Woods: total depth ___ feet; cased depth ___ feet; aquifer Cambrian-Ordovician; capacity ___ gpm; distance from site ___ miles; population served ___

Department of Conservation: elevation ___ feet; total depth ___ feet; cased depth ___ feet; aquifer Cambrian-Ordovician; capacity ___ gpm; distance from site ___ miles; population served ___.

TABLE 1

(continued)

New Tribes: total depth ___ feet; cased depth ___ feet; aquifer Cambrian-Ordovician; capacity ___ gpm; distance from site 4.0 miles; population served ___.

Oak Bluff Condominiums: total depth 545 feet; cased depth 350 feet; aquifer Cambrian-Ordovician; capacity 60 gpm; distance from site 2.7 miles; population served ___.

Southway Terrace MHC: total depth 505 feet; cased depth 350 feet; aquifer Cambrian-Ordovician; capacity ___ gpm; distance from site 2.5 miles; population served ___.

Watkins Subdivision: total depth 690 feet; cased depth 440 feet; aquifer Cambrian-Ordovician; capacity 60 gpm; distance from site 1.8 miles; population served ___.

Whispering Hills: total depth ___ feet; cased depth ___ feet; aquifer Cambrian-Ordovician; capacity __ gpm; distance from site ___ miles; population served ___.

___ means no information obtained.

Private Water Supplies

Many motels, hotels, and restaurants along Highway 54 south of Camdenton.

All of the residences not served by the above systems

Former Hulett Lagoon Site
Combined PA/SI
Reference 36

MISSOURI DEPARTMENT OF NATURAL RE
DIVISION OF ENVIRONMENTAL QUAL
ENVIRONMENTAL SERVICES PROGRAM

RECEIVED
JAN 4 1993
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL R

Site Sampling Report
Sundstrand Site
Camdenton, MO
July 20 through July 31, 1992

INTRODUCTION

As part of a site inspection authorized by the Federal Comprehensive Environmental Response, Compensation, and Liability Act, sampling was conducted at the Sundstrand Site in Camdenton, Missouri. The sampling was requested by the Missouri Department of Natural Resources (MDNR), Hazardous Waste Program (HWP), to determine whether hazardous substance releases from the Sundstrand Tubular Products facility (presently Modine Heat Transfer) has caused groundwater contamination in the area. Previous sampling conducted by Modine contractors indicated that soils around the site have been contaminated with trichloroethylene (TCE), 1,1,1 trichloroethane (TCA), tetrachloroethylene (PCE) and vinyl chloride.

Sampling during this inspection included soil and groundwater produced from the construction of monitoring wells on Modine Heat Transfer property, neighboring private wells, surface water from a creek downgradient from the site, and a spring David Mosby of the MDNR, Environmental Services Program (ESP), collected samples and provided contractor oversite. Edith Starbuck of the MDNR, Division of Geology and Land Survey, was present throughout the inspection to provide technical support during well drilling. Floyd Chilcutt and Bert Williams operated the drill rig for Layne-Western Company, subcontractors for the site. Don Mans of Modine Manufacturing Company split some of the samples collected during the inspection. The sampling data will be used in scoring the site according to the U.S. EPA's hazard ranking system.

METHODS

Two monitoring wells (MW#1 and MW#2) were drilled and sampled during the site inspection. An air-rotary drill rig was used for well construction. Monitoring well #1 (MW#1) was drilled south of the facility parking lot at a location considered downgradient of the contaminated area. Monitoring well #2 (MW#2) was drilled near the northeast side of the facility at a location considered to be upgradient of the contamination. (See Appendix A for sampling locations.)

During drilling, soil was collected at five-foot intervals with a split spoon sampler and placed in containers with stainless steel spoons. Surface samples at both drilling locations were collected as direct grabs with stainless steel spoons because samples at this depth could not be collected with the split spoon sampler. Soil samples and drilling activities were monitored for organic vapors using a flame ionization detector (FID) or a photoionization detector (PID).

Drilling of wells ceased when sufficient water was encountered in the desired monitoring zone. After drilling was completed, wells were cased, screened, and grouted by Layne-Western and developed by MDNR and Layne-Western personnel. Wells were developed with a Grundfos submersible pump and/or stainless steel or Teflon bailer. Wells were purged until water turbidity decreased or until field parameters of conductivity, pH, and temperature, measured after each well volume, stabilized within 10% of the prior reading. Three volumes were purged from both wells during development.

Wells were sampled no earlier than the following day after development. Prior to sampling, one to three additional well volumes were purged depending on field parameter stability. Samples were collected by lowering a stainless steel or Teflon bailer to the bottom of the water column, pulling the bailer back up through the well, and filling sample containers directly

Groundwater was sampled from three private wells located downgradient from the site at the E.M Gillemberg, Robert E. Bailey, and Steve Fera residences. Samples were collected from an outside tap after running water out of the lines for three to five minutes.

Two grab samples were collected of surface water downgradient of the site by submersing the appropriate containers into the water body. A small creek, which flows through Jarvis Hollow (just below MW#1) and Ha Ha Tonka Spring, which flows into the Lake of the Ozarks approximately $2\frac{1}{4}$ miles south of the site, were sampled.

An equipment blank was collected of the rinsate from the decontamination of the pump and hose used to develop and purge the wells. This sample was collected after sampling MW#1 and before sampling MW#2. Tap water from the facility was used as the rinse water.

The following samples were collected at the above mentioned locations:

SAMPLE #	LOCATION	SAMPLE TYPE	DATE
92-6915	MW#1 10-12 feet deep	soil boring	7/20/92
92-6916	MW#1 15-17 feet deep	soil boring	7/20/92
92-6917	MW#1 20-20.5 feet deep	soil boring	7/20/92
92-6918	creek below site in Jarvis Hollow	surface water	7/22/92
92-6919	Ha Ha Tonka Spring at state park	surface water	7/22/92
92-6920	E.M. Gillemberg residence	groundwater	7/28/92
92-6921	Robert E. Bailey residence	groundwater	7/28/92
92-6922	Steve Fera residence	groundwater	7/28/92
92-6923	MW#2 0-3 inches deep	soil grab	7/28/92
92-6924	MW#2 5-5.5 feet deep	soil boring	7/28/92
92-6925	MW#2 10-12 feet deep	soil boring	7/28/92
92-6926	MW#2 15-16 feet deep	soil boring	7/28/92
92-6927	MW#2 20-22 feet deep	soil boring	7/28/92
92-6928	MW#1	groundwater	7/30/92
92-6930	Sundstrand Site	rinsate blank	7/30/92
92-6931	MW#2	groundwater	7/31/92
92-6932	MW#1 0-3 inches deep	soil grab	7/31/92

All samples were analyzed for volatile organics at the state's environmental laboratory within the Environmental Services Program in Jefferson City. Each sample was given a numbered tag and the corresponding number was recorded on a chain-of-custody form. Other laboratory procedures were followed according to the requirements and standard operating procedures of the Preliminary Assessment/Site Inspection Quality Assurance Project Plan for Fiscal Year 1992.

OBSERVATIONS

Voids at the bedrock/soil interface or in the competent rock itself impeded drilling progress and well construction at MW#1 An outer casing of steel had to be set 80 feet deep and grouted around the outside in order to advance this well to the desired depth

Total well depth of MW#1 was 161 feet and MW#2 was 197 feet. Static water levels were 144 feet and 174.5 feet for MW#1 and MW#2, respectively.

Water in the monitoring wells changed from turbid and reddish-brown, to silty and grey, and finally to colorless and clear during development and purging Since well samples were collected from the bottom of the water column, they were grey and silty, even though water from the top of the water column was colorless and clear.

No organic vapors were detected in the soil borings or drilling air returns from any of the wells.

Soil samples were predominantly composed of red clay Amounts of chert, limestone, topsoil, sandstone, and stringers of tan-colored clay varied with depth and location. Soil from the boring of MW#2 contained more tan clay and sand than MW#1.

Don Mans reported in a phone conversation to Dave Mosby that the sample they split of MW#2 contained low levels of TCE below the detection level used by the MDNR laboratory. Modine did not split the water sample of MW#1.

RESULTS

See Appendix B for sample results.

Submitted by

David E Mosby
Environmental Specialist
Superfund Unit
Environmental Services Program

Date Dec 31, 1992

Approved by

James H Long
Director
Environmental Services Program

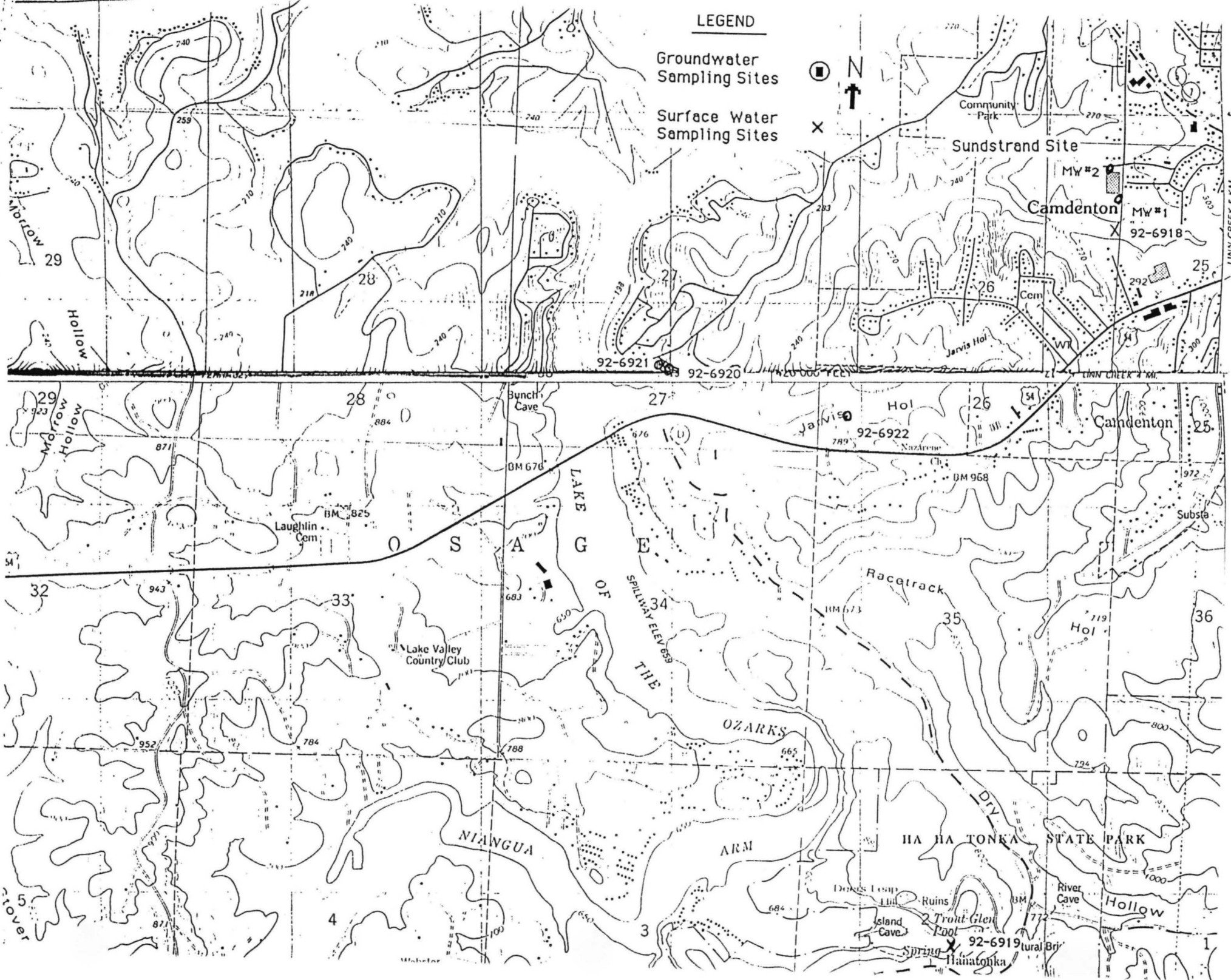
JHL dmd

c Julie Bloss, Environmental Specialist, PA/SI Unit, Superfund Section, Hazardous Waste Program

APPENDIX A

SAMPLING REPORT
SUNDSTRAND SITE
CAMDENTON, MO

Site Map


LEGEND
Groundwater Sampling Sites
Surface Water Sampling Sites
N
Community Park
Sundstrand Site
MW #2
MW #1
92-6918
Camdenton
92-6921
92-6920
92-6922
92-6919
Bunch Cave
Laughlin Cem
Lake Valley Country Club
LAKE OF THE OZARKS
SPILLWAY ELEV 659
Racetrack
Jarvis Hol
Morrow Hollow
Dry Island Cave
Trout Glen Pool
River Cave
Hollow
Spring
Hahatonka
HA HA TONKA STATE PARK
NIANGUA ARM
Webster
Substa
Cem
Ch
Ruins
BM
29
28
27
26
25
32
33
34
35
36
5
4
3
2
1

APPENDIX B

SAMPLING REPORT
SUNDSTRAND SITE
CAMDENTON, MO

Sampling Data
July 20 through July 31, 1992

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6915

Reported to DAVID MOSBY
Affiliation SPFD

Date 12/30/92
Project Code 3658/3000

Sample Description
SUNDSTRAND (MODINE MANUFACTURING CO) SITE
CAMDENTON, MO , GRAB OF BOREHOLE CORE
OF SOIL AT 10-12 FT , MW# 1

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/20/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 25 ug/Kg
1,1,2,2-Tetrachloroethane	< 25 ug/Kg
1,1,2-Trichloroethane	< 25 ug/Kg
1,1-Dichloroethane	< 25 ug/Kg
1,1-Dichloroethylene	< 25 ug/Kg
1,2-Dichloroethane	< 25 ug/Kg
1,2-Dichloroethene (Total)	< 25 ug/Kg
1,2-Dichloropropane	< 25 ug/Kg
2-Butanone	< 100 ug/Kg
2-Hexanone	< 100 ug/Kg
4-Methyl-2-Pentanone	< 100 ug/Kg
Acetone	< 100 ug/Kg
Benzene	< 25 ug/Kg
Bromodichloromethane	< 25 ug/Kg
Bromoform	< 25 ug/Kg
Bromomethane	< 25 ug/Kg
Carbon Disulfide	< 25 ug/Kg
Carbon Tetrachloride	< 25 ug/Kg
Chlorobenzene	< 25 ug/Kg
Chloroethane	< 25 ug/Kg

PARAMETERS	RESULTS
Chloroform	< 25 ug/Kg
Chloromethane	< 25 ug/Kg
cis-1,3-Dichloropropene	< 25 ug/Kg
Dibromochloromethane	< 25 ug/Kg
Ethylbenzene	< 25 ug/Kg
Methylene Chloride	< 25 ug/Kg
Styrene	< 25 ug/Kg
Tetrachloroethene	< 25 ug/Kg
Toluene	< 25 ug/Kg
trans-1,3-Dichloropropene	< 25 ug/Kg
Trichloroethene	< 25 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride/Chloroethene	< 25 ug/Kg
Xylenes (Total)	< 25 ug/Kg

COMMENTS Analyzed by GC/MS at the Missouri DNR laboratory

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6916

Reported to DAVID MOSBY
Affiliation SPFD

Date 12/30/92
Project Code 3658/3000

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO , GRAB OF BOREHOLE CORE
OF SOIL AT 15-17 FT , MW# 1

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/20/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 25 ug/Kg
1,1,2,2-Tetrachloroethane	< 25 ug/Kg
1,1,2-Trichloroethane	< 25 ug/Kg
1,1-Dichloroethane	< 25 ug/Kg
1,1-Dichloroethylene	< 25 ug/Kg
1,2-Dichloroethane	< 25 ug/Kg
1,2-Dichloroethene (Total)	< 25 ug/Kg
1,2-Dichloropropane	< 25 ug/Kg
2-Butanone	< 100 ug/Kg
2-Hexanone	< 100 ug/Kg
4-Methyl-2-Pentanone	< 100 ug/Kg
Acetone	< 100 ug/Kg
Benzene	< 25 ug/Kg
Bromodichloromethane	< 25 ug/Kg
Bromoform	< 25 ug/Kg
Bromomethane	< 25 ug/Kg
Carbon Disulfide	< 25 ug/Kg
Carbon Tetrachloride	< 25 ug/Kg
Chlorobenzene	< 25 ug/Kg
Chloroethane	< 25 ug/Kg

Sample no 92-6916
Date 12/30/92

PARAMETERS	RESULTS
Chloroform	< 25 ug/Kg
Chloromethane	< 25 ug/Kg
cis-1,3-Dichloropropene	< 25 ug/Kg
Dibromochloromethane	< 25 ug/Kg
Ethylbenzene	< 25 ug/Kg
Methylene Chloride	< 25 ug/Kg
Styrene	< 25 ug/Kg
Tetrachloroethene	< 25 ug/Kg
Toluene	< 25 ug/Kg
trans-1,3-Dichloropropene	< 25 ug/Kg
Trichloroethene	< 25 ug/Kg
Vinyl Acetate	< 100 ug/Kg
inyl Chloride/Chloroethene	< 25 ug/Kg
ylenes (Total)	< 25 ug/Kg

COMMENTS Analyzed by GC/MS at the Missouri DNR laboratory

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6917

Reported to DAVID MOSBY
Affiliation SPFD

Date 12/30/92
Project Code 3658/3000

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO , GRAB OF BOREHOLE CORE
OF SOIL AT 20-20 5 FT , MW# 1

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/20/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 25 ug/Kg
1,1,2,2-Tetrachloroethane	< 25 ug/Kg
1,1,2-Trichloroethane	< 25 ug/Kg
1,1-Dichloroethane	< 25 ug/Kg
1,1-Dichloroethylene	< 25 ug/Kg
1,2-Dichloroethane	< 25 ug/Kg
1,2-Dichloroethene (Total)	< 25 ug/Kg
1,2-Dichloropropane	< 25 ug/Kg
2-Butanone	< 100 ug/Kg
2-Hexanone	< 100 ug/Kg
4-Methyl-2-Pentanone	< 100 ug/Kg
Acetone	< 100 ug/Kg
Benzene	< 25 ug/Kg
Bromodichloromethane	< 25 ug/Kg
Bromoform	< 25 ug/Kg
Bromomethane	< 25 ug/Kg
Carbon Disulfide	< 25 ug/Kg
Carbon Tetrachloride	< 25 ug/Kg
Chlorobenzene	< 25 ug/Kg
Chloroethane	< 25 ug/Kg

PARAMETERS	RESULTS
Chloroform	< 25 ug/Kg
Chloromethane	< 25 ug/Kg
cis-1,3-Dichloropropene	< 25 ug/Kg
Dibromochloromethane	< 25 ug/Kg
Ethylbenzene	< 25 ug/Kg
Methylene Chloride	< 25 ug/Kg
Styrene	< 25 ug/Kg
Tetrachloroethene	< 25 ug/Kg
Toluene	< 25 ug/Kg
trans-1,3-Dichloropropene	< 25 ug/Kg
Trichloroethene	< 25 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride/Chloroethene	< 25 ug/Kg
Xylenes (Total)	< 25 ug/Kg

COMMENTS Analyzed by GC/MS at the Missouri DNR laboratory

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6918

Reported to DAVID MOSBY
Affiliation SPFD

Date 12/30/92
Project Code 3658/3000

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO , GRAB OF CREEK DOWN HILL FROM FACILITY

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/22/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/L
1,1,2,2-Tetrachloroethane	< 5 0 ug/L
1,1,2-Trichloroethane	< 5 0 ug/L
1,1-Dichloroethane	< 5 0 ug/L
1,1-Dichloroethylene	< 5 0 ug/L
1,2-Dichloroethane	< 5 0 ug/L
1,2-Dichloroethene (Total)	< 5 0 ug/L
1,2-Dichloropropane	< 5 0 ug/L
2-Butanone	< 100 ug/L
2-Hexanone	< 100 ug/L
4-Methyl-2-Pentanone	< 100 ug/L
Acetone	< 100 ug/L
Benzene	< 5 0 ug/L
Bromodichloromethane	< 5 0 ug/L
Bromoform	< 5 0 ug/L
Bromomethane	< 5 0 ug/L
Carbon Disulfide	< 5 0 ug/L
Carbon Tetrachloride	< 5 0 ug/L
Chlorobenzene	< 5 0 ug/L
Chloroethane	< 5 0 ug/L
Chloroform	< 5 0 ug/L

Sample no 92-6918
Date 12/30/92

PARAMETERS	RESULTS
Chloromethane	< 5 0 ug/L
cis-1,3-Dichloropropene	< 5 0 ug/L
Dibromochloromethane	< 5 0 ug/L
Ethylbenzene	< 5 0 ug/L
Methylene Chloride	< 5 0 ug/L
Styrene	< 5 0 ug/L
Tetrachloroethene	< 5 0 ug/L
Toluene	< 5 0 ug/L
trans-1,3-Dichloropropene	< 5 0 ug/L
Trichloroethene	< 5 0 ug/L
Vinyl Acetate	< 100 ug/L
Vinyl Chloride/Chloroethene	< 5 0 ug/L
Xylenes (Total)	< 5 0 ug/L

COMMENTS Analyzed by GC/MS at the Missouri DNR Environmental Services Program laboratory

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6919

Reported to DAVID MOSBY
Affiliation SPFD

Date 12/30/92
Project Code 3658/3000

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO , GRAB OF HA HA TONKA SPRING
HA HA TONKA STATE PARK

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/22/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/L
1,1,2,2-Tetrachloroethane	< 5 0 ug/L
1,1,2-Trichloroethane	< 5 0 ug/L
1,1-Dichloroethane	< 5 0 ug/L
1,1-Dichloroethylene	< 5 0 ug/L
1,2-Dichloroethane	< 5 0 ug/L
1,2-Dichloroethene (Total)	< 5 0 ug/L
1,2-Dichloropropane	< 5 0 ug/L
2-Butanone	< 100 ug/L
2-Hexanone	< 100 ug/L
4-Methyl-2-Pentanone	< 100 ug/L
Acetone	< 100 ug/L
Benzene	< 5 0 ug/L
Bromodichloromethane	< 5 0 ug/L
Bromoform	< 5 0 ug/L
Bromomethane	< 5 0 ug/L
Carbon Disulfide	< 5 0 ug/L
Carbon Tetrachloride	< 5 0 ug/L
Chlorobenzene	< 5 0 ug/L
Chloroethane	< 5 0 ug/L

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/L
Chloromethane	< 5 0 ug/L
cis-1,3-Dichloropropene	< 5 0 ug/L
Dibromochloromethane	< 5 0 ug/L
Ethylbenzene	< 5 0 ug/L
Methylene Chloride	< 5 0 ug/L
Styrene	< 5 0 ug/L
Tetrachloroethene	< 5 0 ug/L
Toluene	< 5 0 ug/L
trans-1,3-Dichloropropene	< 5 0 ug/L
Trichloroethene	< 5 0 ug/L
Vinyl Acetate	< 100 ug/L
inyl Chloride/Chloroethene	< 5 0 ug/L
Xylenes (Total)	< 5 0 ug/L

COMMENTS Analyzed by GC/MS at the Missouri DNR Environmental Services Program laboratory

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6920

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3148

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO
GRAB OF WELL FROM E M GILLENBERG HOUSEHOLD

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/28/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/L
1,1,2,2-Tetrachloroethane	< 5 0 ug/L
1,1,2-Trichloroethane	< 5 0 ug/L
1,1-Dichloroethane	< 5 0 ug/L
1,1-Dichloroethylene	< 5 0 ug/L
1,2-Dichloroethane	< 5 0 ug/L
1,2-Dichloroethene (Total)	< 5 0 ug/L
1,2-Dichloropropane	< 5 0 ug/L
2-Butanone	< 100 ug/L
2-Hexanone	< 50 ug/L
4-Methyl-2-Pentanone	< 50 ug/L
Acetone	< 100 ug/L
Benzene	< 5 0 ug/L
Bromodichloromethane	< 5 0 ug/L
Bromoform	< 5 0 ug/L
Bromomethane	< 5 0 ug/L
Carbon Disulfide	< 5 0 ug/L
Carbon Tetrachloride	< 5 0 ug/L
Chlorobenzene	< 5 0 ug/L
Chloroethane	< 5 0 ug/L

Sample no 92-6920
Date 9/02/92

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/L
Chloromethane	< 5 0 ug/L
cis-1,3-Dichloropropene	< 5 0 ug/L
Dibromochloromethane	< 5 0 ug/L
Ethylbenzene	< 5 0 ug/L
Methylene Chloride	< 5 0 ug/L
Styrene	< 5 0 ug/L
Tetrachloroethene	< 5 0 ug/L
Toluene	< 5 0 ug/L
trans-1,3-Dichloropropene	< 5 0 ug/L
Trichloroethene	< 5 0 ug/L
Vinyl Acetate	< 100 ug/L
Vinyl Chloride/Chloroethene	< 5 0 ug/L
Xylenes (Total)	< 5 0 ug/L

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6921

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3148

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO
GRAB OF WELL FROM ROBERT E BAILEY HOUSEHOLD

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/28/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/L
1,1,2,2-Tetrachloroethane	< 5 0 ug/L
1,1,2-Trichloroethane	< 5 0 ug/L
1,1-Dichloroethane	< 5 0 ug/L
1,1-Dichloroethylene	< 5 0 ug/L
1,2-Dichloroethane	< 5 0 ug/L
1,2-Dichloroethene (Total)	< 5 0 ug/L
1,2-Dichloropropane	< 5 0 ug/L
2-Butanone	< 100 ug/L
2-Hexanone	< 50 ug/L
4-Methyl-2-Pentanone	< 50 ug/L
Acetone	< 100 ug/L
Benzene	< 5 0 ug/L
Bromodichloromethane	< 5 0 ug/L
Bromoform	< 5 0 ug/L
Bromomethane	< 5 0 ug/L
Carbon Disulfide	< 5 0 ug/L
Carbon Tetrachloride	< 5 0 ug/L
Chlorobenzene	< 5 0 ug/L
Chloroethane	< 5 0 ug/L

Sample no 92-6921
Date 9/02/92

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/L
Chloromethane	< 5 0 ug/L
cis-1,3-Dichloropropene	< 5 0 ug/L
Dibromochloromethane	< 5 0 ug/L
Ethylbenzene	< 5 0 ug/L
Methylene Chloride	< 5 0 ug/L
Styrene	< 5 0 ug/L
Tetrachloroethene	< 5 0 ug/L
Toluene	< 5 0 ug/L
trans-1,3-Dichloropropene	< 5 0 ug/L
Trichloroethene	< 5 0 ug/L
Vinyl Acetate	< 100 ug/L
Vinyl Chloride/Chloroethene	< 5 0 ug/L
Xylenes (Total)	< 5 0 ug/L

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6922

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3148

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO
GRAB OF WELL FROM STEVE FERRA HOUSEHOLD

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/28/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/L
1,1,2,2-Tetrachloroethane	< 5 0 ug/L
1,1,2-Trichloroethane	< 5 0 ug/L
1,1-Dichloroethane	< 5 0 ug/L
1,1-Dichloroethylene	< 5 0 ug/L
1,2-Dichloroethane	< 5 0 ug/L
1,2-Dichloroethene (Total)	< 5 0 ug/L
1,2-Dichloropropane	< 5 0 ug/L
2-Butanone	< 100 ug/L
2-Hexanone	< 50 ug/L
4-Methyl-2-Pentanone	< 50 ug/L
Acetone	< 100 ug/L
Benzene	< 5 0 ug/L
Bromodichloromethane	< 5 0 ug/L
Bromoform	< 5 0 ug/L
Bromomethane	< 5 0 ug/L
Carbon Disulfide	< 5 0 ug/L
Carbon Tetrachloride	< 5 0 ug/L
Chlorobenzene	< 5 0 ug/L
Chloroethane	< 5 0 ug/L

Sample no 92-6922
Date 9/02/92

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/L
Chloromethane	< 5 0 ug/L
cis-1,3-Dichloropropene	< 5 0 ug/L
Dibromochloromethane	< 5 0 ug/L
Ethylbenzene	< 5 0 ug/L
Methylene Chloride	< 5 0 ug/L
Styrene	< 5 0 ug/L
Tetrachloroethene	< 5 0 ug/L
Toluene	< 5 0 ug/L
trans-1,3-Dichloropropene	< 5 0 ug/L
Trichloroethene	< 5 0 ug/L
Vinyl Acetate	< 100 ug/L
Vinyl Chloride/Chloroethene	< 5 0 ug/L
ylenes (Total)	< 5 0 ug/L

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6923

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3148

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO
GRAB OF SOIL FROM MW #2 FROM 0-3 INCHES DEEP

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/28/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/Kg
1,1,2,2-Tetrachloroethane	< 5 0 ug/Kg
1,1,2-Trichloroethane	< 5 0 ug/Kg
1,1-Dichloroethane	< 5 0 ug/Kg
1,1-Dichloroethylene	< 5 0 ug/Kg
1,2-Dichloroethane	< 5 0 ug/Kg
1,2-Dichloroethene (Total)	< 5 0 ug/Kg
1,2-Dichloropropane	< 5 0 ug/Kg
2-Butanone	< 100 ug/Kg
2-Hexanone	< 50 ug/Kg
4-Methyl-2-Pentanone	< 50 ug/Kg
Acetone	< 100 ug/Kg
Benzene	< 5 0 ug/Kg
Bromodichloromethane	< 5 0 ug/Kg
Bromoform	< 5 0 ug/Kg
Bromomethane	< 5 0 ug/Kg
Carbon Disulfide	< 5 0 ug/Kg
Carbon Tetrachloride	< 5 0 ug/Kg
Chlorobenzene	< 5 0 ug/Kg
Chloroethane	< 5 0 ug/Kg

Sample no 92-6923
Date 9/02/92

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/Kg
Chloromethane	< 5 0 ug/Kg
cis-1,3-Dichloropropene	< 5 0 ug/Kg
Dibromochloromethane	< 5 0 ug/Kg
Ethylbenzene	< 5 0 ug/Kg
Methylene Chloride	< 5 0 ug/Kg
Styrene	< 5 0 ug/Kg
Tetrachloroethene	< 5 0 ug/Kg
Toluene	< 5 0 ug/Kg
trans-1,3-Dichloropropene	< 5 0 ug/Kg
Trichloroethene	< 5 0 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride/Chloroethene	< 5 0 ug/Kg
Xylenes (Total)	< 5 0 ug/Kg

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6924

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3148

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO
GRAB OF SOIL FROM MW #2 FROM 5 - 5 5 FT DEEP

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/28/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/Kg
1,1,2,2-Tetrachloroethane	< 5 0 ug/Kg
1,1,2-Trichloroethane	< 5 0 ug/Kg
1,1-Dichloroethane	< 5 0 ug/Kg
1,1-Dichloroethylene	< 5 0 ug/Kg
1,2-Dichloroethane	< 5 0 ug/Kg
1,2-Dichloroethene (Total)	< 5 0 ug/Kg
1,2-Dichloropropane	< 5 0 ug/Kg
2-Butanone	< 100 ug/Kg
2-Hexanone	< 50 ug/Kg
4-Methyl-2-Pentanone	< 50 ug/Kg
Acetone	< 100 ug/Kg
Benzene	< 5 0 ug/Kg
Bromodichloromethane	< 5 0 ug/Kg
Bromoform	< 5 0 ug/Kg
Bromomethane	< 5 0 ug/Kg
Carbon Disulfide	< 5 0 ug/Kg
Carbon Tetrachloride	< 5 0 ug/Kg
Chlorobenzene	< 5 0 ug/Kg
Chloroethane	< 5 0 ug/Kg

Sample no 92-6924
Date 9/02/92

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/Kg
Chloromethane	< 5 0 ug/Kg
cis-1,3-Dichloropropene	< 5 0 ug/Kg
Dibromochloromethane	< 5 0 ug/Kg
Ethylbenzene	< 5 0 ug/Kg
Methylene Chloride	< 5 0 ug/Kg
Styrene	< 5 0 ug/Kg
Tetrachloroethene	< 5 0 ug/Kg
Toluene	< 5 0 ug/Kg
trans-1,3-Dichloropropene	< 5 0 ug/Kg
Trichloroethene	6 8 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride/Chloroethene	< 5 0 ug/Kg
Xylenes (Total)	< 5 0 ug/Kg

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6925

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3148

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO
GRAB OF SOIL FROM BORING FOR MW #2 FROM 10 - 12 FT DEEP

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/28/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/Kg
1,1,2,2-Tetrachloroethane	< 5 0 ug/Kg
1,1,2-Trichloroethane	< 5 0 ug/Kg
1,1-Dichloroethane	< 5 0 ug/Kg
1,1-Dichloroethylene	< 5 0 ug/Kg
1,2-Dichloroethane	< 5 0 ug/Kg
1,2-Dichloroethene (Total)	< 5 0 ug/Kg
1,2-Dichloropropane	< 5 0 ug/Kg
2-Butanone	< 100 ug/Kg
2-Hexanone	< 50 ug/Kg
4-Methyl-2-Pentanone	< 50 ug/Kg
Acetone	< 100 ug/Kg
Benzene	< 5 0 ug/Kg
Bromodichloromethane	< 5 0 ug/Kg
Bromoform	< 5 0 ug/Kg
Bromomethane	< 5 0 ug/Kg
Carbon Disulfide	< 5 0 ug/Kg
Carbon Tetrachloride	< 5 0 ug/Kg
Chlorobenzene	< 5 0 ug/Kg
Chloroethane	< 5 0 ug/Kg

Sample no 92-6925
Date 9/02/92

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/Kg
Chloromethane	< 5 0 ug/Kg
cis-1,3-Dichloropropene	< 5 0 ug/Kg
Dibromochloromethane	< 5 0 ug/Kg
Ethylbenzene	< 5 0 ug/Kg
Methylene Chloride	< 5 0 ug/Kg
Styrene	< 5 0 ug/Kg
Tetrachloroethene	< 5 0 ug/Kg
Toluene	< 5 0 ug/Kg
trans-1,3-Dichloropropene	< 5 0 ug/Kg
Trichloroethene	< 5 0 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride/Chloroethene	< 5 0 ug/Kg
Xylenes (Total)	< 5 0 ug/Kg

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6926

Reported to DAVID MOSBY
Affiliation SPFD

Date 12/30/92
Project Code 3658/3148

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO
GRAB OF SOIL FROM BORING FOR MW #2 FROM 15 - 16 FT DEEP

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/28/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/Kg
1,1,2,2-Tetrachloroethane	< 5 0 ug/Kg
1,1,2-Trichloroethane	< 5 0 ug/Kg
1,1-Dichloroethane	< 5 0 ug/Kg
1,1-Dichloroethylene	< 5 0 ug/Kg
1,2-Dichloroethane	< 5 0 ug/Kg
1,2-Dichloroethene (Total)	< 5 0 ug/Kg
1,2-Dichloropropane	< 5 0 ug/Kg
2-Butanone	< 100 ug/Kg
2-Hexanone	< 50 ug/Kg
4-Methyl-2-Pentanone	< 50 ug/Kg
Acetone	< 100 ug/Kg
Benzene	< 5 0 ug/Kg
Bromodichloromethane	< 5 0 ug/Kg
Bromoform	< 5 0 ug/Kg
Bromomethane	< 5 0 ug/Kg
Carbon Disulfide	< 5 0 ug/Kg
Carbon Tetrachloride	< 5 0 ug/Kg
Chlorobenzene	< 5 0 ug/Kg
Chloroethane	< 5 0 ug/Kg

Sample no 92-6926
Date 12/30/92

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/Kg
Chloromethane	< 5 0 ug/Kg
cis-1,3-Dichloropropene	< 5 0 ug/Kg
Dibromochloromethane	< 5 0 ug/Kg
Ethylbenzene	< 5 0 ug/Kg
Methylene Chloride	< 5 0 ug/Kg
Styrene	< 5 0 ug/Kg
Tetrachloroethene	< 5 0 ug/Kg
Toluene	< 5 0 ug/Kg
trans-1,3-Dichloropropene	< 5 0 ug/Kg
Trichloroethene	37 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride/Chloroethene	< 5 0 ug/Kg
Xylenes (Total)	< 5 0 ug/Kg

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6927

Reported to DAVID MOSBY Date 9/02/92
Affiliation SPFD Project Code 3658/3148

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO
GRAB OF SOIL FROM BORING FOR MW #2 FROM 20 - 22 FT DEEP

Collected by DAVID MOSBY Date 07/28/92
Affiliation SPFD

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/Kg
1,1,2,2-Tetrachloroethane	< 5 0 ug/Kg
1,1,2-Trichloroethane	< 5 0 ug/Kg
1,1-Dichloroethane	< 5 0 ug/Kg
1,1-Dichloroethylene	< 5 0 ug/Kg
1,2-Dichloroethane	< 5 0 ug/Kg
1,2-Dichloroethene (Total)	< 5 0 ug/Kg
1,2-Dichloropropane	< 5 0 ug/Kg
2-Butanone	< 100 ug/Kg
2-Hexanone	< 50 ug/Kg
4-Methyl-2-Pentanone	< 50 ug/Kg
Acetone	< 100 ug/Kg
Benzene	< 5 0 ug/Kg
Bromodichloromethane	< 5 0 ug/Kg
Bromoform	< 5 0 ug/Kg
Bromomethane	< 5 0 ug/Kg
Carbon Disulfide	< 5 0 ug/Kg
Carbon Tetrachloride	< 5 0 ug/Kg
Chlorobenzene	< 5 0 ug/Kg
Chloroethane	< 5 0 ug/Kg

Sample no 92-6927
Date 9/02/92

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/Kg
Chloromethane	< 5 0 ug/Kg
cis-1,3-Dichloropropene	< 5 0 ug/Kg
Dibromochloromethane	< 5 0 ug/Kg
Ethylbenzene	< 5 0 ug/Kg
Methylene Chloride	< 5 0 ug/Kg
Styrene	< 5 0 ug/Kg
Tetrachloroethene	< 5 0 ug/Kg
Toluene	< 5 0 ug/Kg
trans-1,3-Dichloropropene	< 5 0 ug/Kg
Trichloroethene	7 1 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride/Chloroethene	< 5 0 ug/Kg
Xylenes (Total)	< 5 0 ug/Kg

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6928

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3000

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO , GRAB OF MW #1

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/30/92

PARAMETERS	RESULTS
TEMPERATURE	16 9 DEGREES C
COMMENTS ANALYZED IN FIELD	
pH	9 8
COMMENTS ANALYZED IN FIELD	
SPECIFIC CONDUCTANCE	219 umhos/cm
COMMENTS ANALYZED IN FIELD	
1,1,1-Trichloroethane	< 5 0 ug/L
1,1,2,2-Tetrachloroethane	< 5 0 ug/L
1,1,2-Trichloroethane	< 5 0 ug/L
1,1-Dichloroethane	< 5 0 ug/L
1,1-Dichloroethylene	< 5 0 ug/L
1,2-Dichloroethane	< 5 0 ug/L
1,2-Dichloroethene (Total)	< 5 0 ug/L
1,2-Dichloropropane	< 5 0 ug/L
2-Butanone	< 100 ug/L
2-Hexanone	< 50 ug/L
4-Methyl-2-Pentanone	< 50 ug/L
Acetone	< 100 ug/L

Sample no 92-6928
Date 9/02/92

PARAMETERS	RESULTS
Benzene	< 5 0 ug/L
Bromodichloromethane	< 5 0 ug/L
Bromoform	< 5 0 ug/L
Bromomethane	< 5 0 ug/L
Carbon Disulfide	< 5 0 ug/L
Carbon Tetrachloride	< 5 0 ug/L
Chlorobenzene	< 5 0 ug/L
Chloroethane	< 5 0 ug/L
Chloroform	< 5 0 ug/L
Chloromethane	< 5 0 ug/L
cis-1,3-Dichloropropene	< 5 0 ug/L
Dibromochloromethane	< 5 0 ug/L
Ethylbenzene	< 5 0 ug/L
Methylene Chloride	< 5 0 ug/L
Styrene	< 5 0 ug/L
Tetrachloroethene	< 5 0 ug/L
Toluene	< 5 0 ug/L
trans-1,3-Dichloropropene	< 5 0 ug/L
Trichloroethene	< 5 0 ug/L
Vinyl Acetate	< 100 ug/L
Vinyl Chloride/Chloroethene	< 5 0 ug/L
Xylenes (Total)	< 5 0 ug/L

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6930

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3000

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO , RINSATE BLANK OF PUMP AND HOSE

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/30/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/L
1,1,2,2-Tetrachloroethane	< 5 0 ug/L
1,1,2-Trichloroethane	< 5 0 ug/L
1,1-Dichloroethane	< 5 0 ug/L
1,1-Dichloroethylene	< 5 0 ug/L
1,2-Dichloroethane	< 5 0 ug/L
1,2-Dichloroethene (Total)	< 5 0 ug/L
1,2-Dichloropropane	< 5 0 ug/L
2-Butanone	< 100 ug/L
2-Hexanone	< 50 ug/L
4-Methyl-2-Pentanone	< 50 ug/L
Acetone	< 100 ug/L
Benzene	< 5 0 ug/L
Bromodichloromethane	< 5 0 ug/L
Bromoform	< 5 0 ug/L
Bromomethane	< 5 0 ug/L
Carbon Disulfide	< 5 0 ug/L
Carbon Tetrachloride	< 5 0 ug/L
Chlorobenzene	< 5 0 ug/L
Chloroethane	< 5 0 ug/L
Chloroform	< 5 0 ug/L

Sample no 92-6930
Date 9/02/92

PARAMETERS	RESULTS
Chloromethane	< 5 0 ug/L
cis-1,3-Dichloropropene	< 5 0 ug/L
Dibromochloromethane	< 5 0 ug/L
Ethylbenzene	< 5 0 ug/L
Methylene Chloride	< 5 0 ug/L
Styrene	< 5 0 ug/L
Tetrachloroethene	< 5 0 ug/L
Toluene	< 5 0 ug/L
trans-1,3-Dichloropropene	< 5 0 ug/L
Trichloroethene	< 5 0 ug/L
Vinyl Acetate	< 100 ug/L
Vinyl Chloride/Chloroethene	< 5 0 ug/L
Xylenes (Total)	< 5 0 ug/L

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6931

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3000

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO , GRAB OF MW #2

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/31/92

PARAMETERS	RESULTS
TEMPERATURE	16 0 DEGREES C
COMMENTS ANALYZED IN FIELD	
pH	7 5
COMMENTS ANALYZED IN FIELD	
SPECIFIC CONDUCTANCE	831 umhos/cm
COMMENTS ANALYZED IN FIELD	
1,1,1-Trichloroethane	< 5 0 ug/L
1,1,2,2-Tetrachloroethane	< 5 0 ug/L
1,1,2-Trichloroethane	< 5 0 ug/L
1,1-Dichloroethane	< 5 0 ug/L
1,1-Dichloroethylene	< 5 0 ug/L
1,2-Dichloroethane	< 5 0 ug/L
1,2-Dichloroethene (Total)	< 5 0 ug/L
1,2-Dichloropropane	< 5 0 ug/L
2-Butanone	< 100 ug/L
2-Hexanone	< 50 ug/L
4-Methyl-2-Pentanone	< 50 ug/L
Acetone	< 100 ug/L

Sample no 92-6931
Date 9/02/92

PARAMETERS	RESULTS
Benzene	< 5 0 ug/L
Bromodichloromethane	< 5 0 ug/L
Bromoform	< 5 0 ug/L
Bromomethane	< 5 0 ug/L
Carbon Disulfide	< 5 0 ug/L
Carbon Tetrachloride	< 5 0 ug/L
Chlorobenzene	< 5 0 ug/L
Chloroethane	< 5 0 ug/L
Chloroform	< 5 0 ug/L
Chloromethane	< 5 0 ug/L
cis-1,3-Dichloropropene	< 5 0 ug/L
Dibromochloromethane	< 5 0 ug/L
Ethylbenzene	< 5 0 ug/L
Methylene Chloride	< 5 0 ug/L
Styrene	< 5 0 ug/L
Tetrachloroethene	< 5 0 ug/L
Toluene	< 5 0 ug/L
trans-1,3-Dichloropropene	< 5 0 ug/L
Trichloroethene	< 5 0 ug/L
Vinyl Acetate	< 100 ug/L
Vinyl Chloride/Chloroethene	< 5 0 ug/L
Xylenes (Total)	< 5 0 ug/L

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No 92-6932

Reported to DAVID MOSBY
Affiliation SPFD

Date 9/02/92
Project Code 3658/3000

Sample Description
SUNDSTRAND SITE (MODINE HEAT TRANSFER)
CAMDENTON, MO, GRAB OF SOIL
NEAR BOREHOLE MW #1 FROM 0-3 INCHES

Collected by DAVID MOSBY
Affiliation SPFD

Date 07/31/92

PARAMETERS	RESULTS
1,1,1-Trichloroethane	< 5 0 ug/Kg
1,1,2,2-Tetrachloroethane	< 5 0 ug/Kg
1,1,2-Trichloroethane	< 5 0 ug/Kg
1,1-Dichloroethane	< 5 0 ug/Kg
1,1-Dichloroethylene	< 5 0 ug/Kg
1,2-Dichloroethane	< 5 0 ug/Kg
1,2-Dichloroethene (Total)	< 5 0 ug/Kg
1,2-Dichloropropane	< 5 0 ug/Kg
2-Butanone	< 100 ug/Kg
2-Hexanone	< 50 ug/Kg
4-Methyl-2-Pentanone	< 50 ug/Kg
Acetone	< 100 ug/Kg
Benzene	< 5 0 ug/Kg
Bromodichloromethane	< 5 0 ug/Kg
Bromoform	< 5 0 ug/Kg
Bromomethane	< 5 0 ug/Kg
Carbon Disulfide	< 5 0 ug/Kg
Carbon Tetrachloride	< 5 0 ug/Kg
Chlorobenzene	< 5 0 ug/Kg
Chloroethane	< 5 0 ug/Kg

Sample no 92-6932
Date 9/02/92

PARAMETERS	RESULTS
Chloroform	< 5 0 ug/Kg
Chloromethane	< 5 0 ug/Kg
cis-1,3-Dichloropropene	< 5 0 ug/Kg
Dibromochloromethane	< 5 0 ug/Kg
Ethylbenzene	< 5 0 ug/Kg
Methylene Chloride	< 5 0 ug/Kg
Styrene	< 5 0 ug/Kg
Tetrachloroethene	< 5 0 ug/Kg
Toluene	< 5 0 ug/Kg
trans-1,3-Dichloropropene	< 5 0 ug/Kg
Trichloroethene	< 5 0 ug/Kg
Vinyl Acetate	< 100 ug/Kg
Vinyl Chloride/Chloroethene	< 5 0 ug/Kg
Xylenes (Total)	< 5 0 ug/Kg

COMMENTS Analyzed by GC/MS at Continental Analytical Services, Inc

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
PO Box 176 Jefferson City MO 65102 0176

MEMORANDUM

DATE September 8, 1998

TO Gary Behrns Chief
Superfund Section Hazardous Waste Program

FROM Arthur H Groner Chief
Permits Section Hazardous Waste Program

SUBJECT Former Hulett Lagoon Camdenton Missouri

The Hazardous Waste Program Permits Section is referring the former Hulett Lagoon in Camdenton, Missouri, to the Hazardous Waste Program Superfund Section The Hulett Lagoon was operated by the City of Camdenton from 1961 to 1988 The City of Camdenton is the current owner of the property The lagoon is located on the east side of Dawson Road and is approximately 1/4 mile northeast of Modine Manufacturing Company (Modine) It received process wastewater from Modine s predecessors Dawson Metal Products from 1967 to 1972 and Sundstrand Tubular Products from 1972 to 1986 Wastewater from the facility contained volatile organic compounds (VOCs) cyanide and various metals In addition to receiving wastewater from the facility the lagoon also received domestic sewage from the surrounding residences A dye trace study of the City of Camdenton's sewer system performed by the Division of Geology and Land Survey (DGLS) on August 5, 1998, verified that facility wastewater mixes with domestic sewage prior to entering city property Therefore the domestic sewage exemption of 40 CFR 261 4 most likely applied during the facility s operating discharges

Closure of the Hulett Lagoon was completed in 1988 by the City of Camdenton pursuant to an Industrial Development Grant overseen by the Missouri Department of Natural Resources Water Pollution Control Program (WPCP) Sampling and analysis of the sludge was limited to metals and total solids High levels of chromium lead and nickel were detected in the sludge The sludge from the lagoon was removed and applied on

the runways at the municipal airport The lagoon berms were turned in and mixed with the surrounding soil The domestic sewage exemption of 40 CFR 261 4 may have applied to the wastewater discharge but is not applicable to the sludges applied on the airport runways The lagoon closure was not designed to meet the substantive requirements of the Hazardous Waste Management Law relative to corrective action At the time of closure no sampling and analysis for VOCs or cyanide were performed, and the horizontal and vertical extent and rate of migration of contamination in environmental media associated with the lagoon were not determined during the 1988 lagoon closure process Hence, the sludge sampling performed was not sufficient for RCRA determinations

Modine has four on-site groundwater monitoring wells and one off-site well located at the southwest edge of the Hulett Lagoon Based on potentiometric maps and a bedrock fracture system study, prepared by Dames & Moore consultants for Modine, the groundwater flow direction is to the southwest Sampling results from one of the on-site wells (MW-4) and the off-site well (MW-5) have shown levels of trichloroethene (TCE) at 173 parts per billion (ppb) and 484 ppb, respectively The Environmental Services Program (ESP) sampled a residential well on April 23 1998 located across the street from the facility and down gradient of monitoring well MW-5 TCE was detected in this well at 210 ppb

TCE was also detected in the City of Camdenton's Mulberry Well as high as 6 3 ppb, which is above the EPA Maximum Contaminant Level (MCL) of 5 ppb The Mulberry Well is located approximately 1/4 mile east of Modine and ½ mile southeast of the Hulett Lagoon The Mulberry Well was the city s highest volume producing well The well is drilled to a total depth of 900 ft below ground surface (bgs) and has a maximum pumping rate of 600 gallons per minute (gpm) The city has taken the Mulberry Well off line and is in the process of drilling a new well

The city has been monitoring the Mulberry Well monthly and the two remaining municipal wells quarterly since February 1998 The two remaining wells have been non detect for TCE and all other constituents During the last sampling event the city sampled a residential well located southwest of the municipal airport TCE was detected in this well at 13 1 ppb Current speculation is that the contamination in this well may have been caused by the application of sludge from the Hulett Lagoon on the airport runways

Due to the close proximity of the Hulett Lagoon and Modine Manufacturing Company and the nature of the groundwater contamination close coordination between the Superfund Section, the Permits Section the Enforcement Section Public Drinking Water Program Jefferson City Regional Office, and the Division of Geology and Land

Survey will be necessary If you have any questions or require additional information regarding this matter, please contact Chris Kump, of my staff, at 751-3068

AHG ckm

c Lyle Crocker, HWP-Enforcement Section
Robert Hentges, JCRO
Cindy Kemper HWP-Director s Office
Ed Knight, WPCP
Terry Timmons PDWP
Diana Travis DGLS
Shelley Woods AGO

bc Christine Kump, HWP
John Jurgensmeyer HWP

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
PO Box 176 Jefferson City MO 65102 0176

MEMORANDUM

DATE March 24 1999

TO Gary Behrns Chief
Superfund Section, Hazardous Waste Program

THROUGH Arthur H Groner Chief
Permits Section Hazardous Waste Program

FROM Christine M Kump Environmental Engineer
Permits Section Hazardous Waste Program

SUBJECT Clarification on Referral Memo - Former Hulett Lagoon Camdenton Missouri

Valerie Wilder, Environmental Specialist, Superfund Section requested I clarify a sentence located in paragraph two of the referral memo sent to you dated September 8 1998 (please see attached letter)

The sentence Ms Wilder requested clarification on reads "The domestic sewage exemption of 40 CFR 261 4 may have applied to the wastewater discharge but is not applicable to the sludges applied on the runways " In consultation with Shelley Woods AGO and other members of the corrective action team prior to writing the referral memo we concluded that Superfund's CERCLA authority would be more inclusive and have stronger support to require action should hazardous constituents be found at or near the runway The corrective action team felt CERCLA's authority would be more defensible in litigation since CERCLA is authorized to pursue hazardous constituents regardless of whether the waste was or is an exempt RCRA hazardous waste

CMK sw

Attachment

Former Hulett Lagoon Site
Combined PA/SI
Reference 38

Combined Preliminary Assessment/Site Inspection Sampling Report

Former Hulett Lagoon Site
Camdenton, Missouri
Camden County

Field Activities Conducted
January 6-7, 1999
January 21, 1999

Prepared For:

Missouri Department of Natural Resources
Division of Environmental Quality
Hazardous Waste Program

Prepared By:

Missouri Department of Natural Resources
Division of Environmental Quality
Environmental Services Program

Table of Contents

1.0 Introduction 1
2.0 Site Information 1
2.1 Location 1
2.2 Description 1
2.3 History/Contaminants of Concern 2
3.0 Methods 3
3.1 General Field Procedures 3
3.2 Groundwater Sampling 4
3.2.1 Residential well/Municipal well samples 4
3.2.2 Monitoring well samples 4
3.3 Soil Sampling 5
3.4 Sample Quantity 5
3.5 Analyses Requested 5
3.6 Chain of Custody 5
4.0 Data Quality 6
4.1 Field Methods 6
4.2 Field Decontamination 6
4.3 Quality Assurance/Quality Control Samples 6
4.3.1 Trip blank 6
4.3.2 Duplicate samples (waters) 6
4.3.3 Replicate sample (soil) 6
5.0 Investigation Derived Wastes (IDW) 7
6.0 Observations 7
6.1 General 7
6.2 Groundwater Sampling 7
6.3 Soil Sampling 9
7.0 Analytical Results 9

Attachments ..... located at the back of document

Tables

Table 1 – Sample Listing
Table 2 – GPS Data Points
Table 3 – Monitoring Well Data

Appendix A – Site Maps

Appendix B – MIP Data Logs

Appendix C – Analytical Results

1.0 Introduction

As authorized under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986, the Missouri Department of Natural Resources (MDNR), Hazardous Waste Program (HWP), Site Evaluation Unit is conducting a combined preliminary assessment/site inspection (PA/SI) on the Former Hulett Lagoon site. The MDNR, HWP requested the MDNR, Environmental Services Program (ESP) prepare and implement a sampling plan as part of the combined PA/SI.

Initially, the Former Hulett Lagoon site consisted of two separate areas of concern. After field activities associated with both areas were complete, HWP personnel requested the site be split into two separate sites, each with its own sampling report. This report covers field activities conducted in association with the actual former Hulett lagoon. A separate report has been prepared which covers field activities associated with the newly established "Camdenton Sludge Disposal Area" site.

Field activities were conducted throughout the month of January. Initial groundwater sampling was conducted on January 6-7, 1999. A soil sampling investigation was conducted on January 21, 1999. ESP personnel involved with the various field activities included Environmental Specialists Brian Allen, Ken Hannon, and Doug Thompson. HWP Environmental Specialist Valerie Wilder was present during all field activities conducted. Information learned from field observations and sampling will be used by the HWP in scoring the site's potential as a hazardous waste site under the CERCLA Hazard Ranking System.

2.0 Site Information

2.1 Location

The Former Hulett Lagoon site is located just east of Dawson Road in Camdenton, MO, approximately ¼ mile northeast of the Modine Manufacturing Company facility. The legal description of the former lagoon is SW ¼ SW ¼ SW ¼ sec. 24, T. 38 N., R. 17 W.

2.2 Description

The Former Hulett Lagoon site is on property owned by the City of Camdenton. The former lagoon is located in a mixed residential/industrial area. The lagoon, closed since 1989, has been vegetated and is generally flat with remnants of the former berm still visible. Surface runoff from this area flows to the northwest and enters a nearby intermittent drainage that travels to the west.

2.3 History/Contaminants of Concern

The former Hulett lagoon was one of five lagoons operated by the City of Camdenton prior to the construction of a municipal wastewater treatment plant. The lagoon was in operation from 1961 until approximately 1988, when the City of Camdenton began closure. In addition to municipal wastes, the Hulett lagoon also received wastes generated from a nearby manufacturing facility (discussed below).

In 1967, Dawson Metal Products built a manufacturing facility located approximately ¼ mile southwest of the Hulett lagoon and began operations. Sundstrand Tubular Products purchased the facility in 1972 and continued operations until 1990, when it was purchased by Modine Heat Transfer, Inc., a wholly owned subsidiary of Modine Manufacturing Company. Modine Manufacturing Company currently owns and operates the facility.

From 1967 to the present, manufacturing operations at this facility have consisted of producing air conditioning coils and feeder parts from aluminum and copper tubing, which have included electroplating and the use of solvents. Prior to the construction of the municipal wastewater treatment plant or any facility pretreatment processes, wastes generated from the facility were discharged, in part at least, to the nearby Hulett lagoon.

The primary contaminants of concern at the site include metals and solvents associated with the manufacturing processes from this facility. Specific metals of concern include copper, chromium, lead, and nickel. Various solvents have been used at the facility, including the primary contaminant of concern for this investigation, trichloroethene (TCE). TCE was reportedly used beginning in the early 1970s and continuing to December 1990. It is likely TCE wastes generated at the facility would have been present in the wastestream discharged to the Hulett lagoon.

As part of the Hulett lagoon closure, the city received approval from MDNR to land apply lagoon sludge to an area immediately south of the Camdenton Airport runway currently identified by the MDNR as the Camdenton Sludge Disposal Area site. Information indicates sampling of the sludge was apparently limited to determining the levels of metals prior to approving the disposal method and that no analyses were conducted for the presence of any volatile organic compounds The lagoon closure was completed in 1989

A preliminary assessment and site inspection were conducted of the manufacturing facility property in 1992, which did not include any off-site investigations of the former lagoon or sludge disposal area. Investigations at that time confirmed the presence of chlorinated solvents, including TCE, in the soils and groundwater. Contamination at the facility is likely a result of historic waste handling practices and spills.

The facility is currently negotiating a Corrective Action Abatement Order on Consent through the Resource Conservation and Recovery Act (RCRA) Unit of the MDNR, HWP. As a result of a specific RCRA exclusion, the current and future RCRA work at the manufacturing facility will not include any investigation of or relating to the former lagoon. Investigation of the former lagoon and sludge disposal area must be conducted under CERCLA authority

In March 1993, 2.1 parts per billion (ppb) TCE were detected in a City of Camdenton municipal well, known as the Mulberry Well, which is located near the manufacturing facility. TCE has consistently been detected in this municipal well since 1997 at levels reaching a high of 11.8 ppb. At least one private well, located directly north of the facility, has been shown to contain TCE at 210 ppb.

The MDNR, HWP has extensive file information on the manufacturing facility and the lagoon closure, which should be referenced for a more comprehensive review of historic regulatory activities.

3.0 Methods

3.1 General Field Procedures

A health and safety briefing was conducted on-site and personnel read and signed the site-specific health and safety plan prior to initiating field activities.

Missouri One-Call was notified of proposed field activities prior to ESP personnel arriving on-site, and all applicable underground utilities marked.

Field instruments, including a photoionization detector (PID), pH, specific conductivity, and temperature meters were calibrated on-site following manufacturers' specifications.

ESP personnel employed established standard operating procedures for the collection of various samples. Containers for each sample were filled based upon the volatility of the analytes of concern with the most volatile analytes being collected first. All samples were collected in certified-clean containers and preserved in the field as appropriate.

ESP personnel collected depth-discrete soil grab samples in selected source areas and groundwater samples from selected private wells, municipal/public wells, and monitoring wells in an effort to determine the types of hazardous wastes which may be present, whether a hazardous substance release has occurred to the environment, and whether the substances have impacted, or may impact, human health and/or the environment. Background samples were also collected of each media sampled from areas that would not appear to be impacted from the site.

An ESP global positioning system (GPS) unit was taken to the field and used to determine the geographic coordinates of each sample location. All sample locations and descriptions were noted in a bound field logbook and locations noted on a site map.

3.2 Groundwater Sampling

Specific conductivity, pH, and temperature were determined for each sample at the time of collection. In addition, turbidity was determined on each sample collected from monitoring wells that was submitted for metals analyses. Personnel attempted to gain pertinent information on each well sampled (age, construction, depth, casing length, screened interval, location of tap, etc.) and record such into the field logbook.

Groundwater grab samples were collected of the City of Camdenton's Mulberry and Blair municipal wells, monitoring wells located on the current Modine Manufacturing Company facility and adjacent to the former lagoon, a private well located immediately north of the facility, and a private well considered to be located downgradient of the former lagoon area.

3.2.1 Residential well/Municipal well samples

In general, samples were collected from taps nearest the well heads after opening the tap at a high flow for approximately five minutes. Sample containers were then filled directly from the taps at a low flow.

3.2.2 Monitoring well samples

Samples were collected by first laying clean plastic sheeting on the ground around each well casing. Personnel then accessed each well and determined the total depth (or referred to well logs) and depth to water, then calculated one well volume. A clean or field decontaminated 2-inch submersible pump using clean food-grade polyethylene tubing or a clean, disposable Teflon® or polyethylene bailer, with clean rope, were used to evacuate one well volume (at a low flow if the pump was used). Personnel determined water quality parameters (pH, specific conductivity, and temperature) and evacuation continued until one of three criteria was met: 1) water quality parameters stabilized (pH within 0.1 units, temperature and specific conductivity within 10%) between two consecutive evacuations; 2) three well volumes were removed; or, 3) the well was evacuated dry.

In the event the well was determined to be going dry, a grab sample was collected as soon as the well had recharged sufficiently. Otherwise, once evacuation was complete, the sample was collected by gently lowering a bailer to the bottom of the well and retrieving water back to the surface. A clean, disposable, volatile organic compound (VOC) bottom-emptying device was used to transfer water directly to sample containers.

3.3 Soil Sampling

A membrane interface probe (MIP) was employed to generate soil gas data of the subsurface within and surrounding the boundaries of the former lagoon area. The soil gas data was used, in part, to determine actual sampling locations.

Soil grab samples were collected from discrete depths utilizing a track-mounted hydraulic soil probe. Clean disposable acetate liners were used in conjunction with the soil probe and inserted into stainless steel macro core samplers fitted with clean cutting shoes. The core samplers were advanced to the desired sampling depth via push tubes and the samplers and soil retrieved. The acetate liners were removed and cut open exposing the soil. Personnel immediately collected soils to be submitted for volatile organics analyses with clean EnCore® sampling devices (two 5gm aliquots). An additional aliquot for volatile organics analyses was collected in a 2-oz glass jar, as a backup. Soils to be submitted for the additional analytes of concern were transferred with clean stainless steel spoons to clean aluminum foil pans, homogenized, then placed into appropriate sample containers.

3.4 Sample Quantity

A total of nine soil grab samples and 13 water grab samples were collected during field activities associated with the Former Hulett Lagoon site and submitted to the ESP laboratory for analyses. These sample numbers include quality assurance/quality control samples. Refer to Table 1 for a listing of all samples collected.

3.5 Analyses Requested

Based on the history of the site and HWP data needs, the following analyses were requested. All water grab samples and soil grab samples were submitted for volatile organics and total metals (As, Ba, Cr, Cd, Cu, Pb, Ni, Hg, Se, Ag) analyses. Water grab samples of monitoring wells were also submitted for dissolved metals (same metals as above) analyses. Instructions were relayed to analytical personnel that if a sample's total analyte results were 80% of twenty times the Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit, TCLP analysis was to be performed on that sample. Additionally, drinking water detection limits were requested for the public and private well samples, as well as any monitoring well samples, where no contaminants were observed above the standard practical quantitation limits.

3.6 Chain of Custody

All samples received a numbered label and the corresponding number was entered onto a chain of custody form indicating the location, date and time of collection, and analytes requested. Samples were stored and transported on ice in coolers. ESP field personnel maintained custody of the samples until relinquishing them to a sample custodian at the state's environmental laboratory within the Environmental Services Program in Jefferson City for analyses.

4.0 Data Quality

To help ensure precise, accurate, representative, complete, and comparable data were achieved, all field work and analyses were conducted in accordance with the Fiscal Year 1999 Quality Assurance Project Plan for Pre-Remedial Site Assessments dated August 14, 1998. Unless otherwise noted, ESP field personnel utilized standard operating procedures established within the ESP, Field Services Section for all samples collected.

4.1 Field Methods

Clean disposable nitrile gloves were worn by sampling personnel and clean equipment utilized for each separate sample collected to minimize the possibility of cross-contamination.

Field personnel noted all observations, sample locations, descriptions, and methods in a bound field logbook.

4.2 Field Decontamination

Field decontamination of sampling equipment was not required during the sampling event.

4.3 Quality Assurance/Quality Control Samples

4.3.1 Trip blank

One trip blank was submitted for the sampling event. The trip blank was taken to the field and accompanied water grab samples collected and transported back to the ESP laboratory. The trip blank received a numbered label, was entered onto the chain-of-custody form, and submitted for volatile organics analyses.

4.3.2 Duplicate samples (waters)

Two duplicate water grab samples were collected/submitted for the sampling event. The duplicate samples were collected at the same location and time as their respective true samples, using similar technique and equipment. Each duplicate sample received a numbered label, was entered onto the chain-of-custody form, and submitted for the same analytes as their respective true samples.

4.3.3 Replicate sample (soil)

One replicate soil grab sample was collected/submitted for the sampling event. The replicate sample was collected by dividing the true sample evenly into two separate samples and submitting each for laboratory analyses. The portion of each true/replicate sample pair submitted for volatile organics was not homogenized prior to collection. The remaining soil was homogenized prior to splitting the true sample into two samples. The replicate sample received a numbered label, was entered onto the chain-of-custody form, and submitted for the same analytes as its true sample.

5.0 Investigation Derived Wastes (IDW)

Efforts were made to minimize IDW generation. IDW included soil, aqueous liquids (groundwater), disposable sampling equipment, and disposable personal protective equipment (PPE).

Field personnel returned unused soils to their source immediately after generation. IDW generated during private and public well evacuation was discharged to the ground. IDW generated during monitoring well evacuations was containerized and discharged to the Modine Manufacturing Company's pretreatment wastewater system. Disposable PPE and disposable sampling equipment were handled as solid waste, containerized, and properly disposed.

6.0 Observations

6.1 General

A significant snow event occurred on January 2, 1999. As a result of the snow-cover diminishing ground visibility and equipment access, field activities conducted on January 6-7, 1999, were limited to the collection of groundwater samples only. The weather on January 6, 1999, was sunny and approximately 30 degrees Fahrenheit with winds light and variable. The weather on January 7, 1999, was overcast and approximately 10 degrees Fahrenheit with winds light and variable.

Personnel returned to the site on January 21, 1999, once snow had melted, to conduct the soil/source investigation and sampling. The weather on January 21, 1999, was overcast and ranged from 40 to 45 degrees Fahrenheit with winds light and variable Light, intermittent rains occurred throughout the day.

GPS coordinates of all sampling points were post-processed at ESP and entered onto a map of the site. Refer to Table 2 for a listing of all sampling point coordinates and Appendix A for the locations of all samples collected.

6.2 Groundwater Sampling

As to not interfere with any planned investigations under the RCRA Corrective Action Abatement Order, work conducted on the Modine Manufacturing facility property was limited to collecting groundwater samples from monitoring wells located on the facility property (no soil investigations were conducted on the Modine Manufacturing property).

Personnel were required to make adjustments to the monitoring well sampling procedures due to the considerable depths of the monitoring wells (depths ranged from 161 to 197 feet) and well diameters. Due to the significant well depths, personnel were not able to accurately field-determine the depth of each well and, instead, relied upon well logs to determine the total depths

of several wells. As a result of the considerable well volumes associated with the 4-inch monitoring wells, personnel recorded water quality parameters at timed intervals, instead of after each well volume, to determine when the parameters were stable and acceptable to collect a sample. This procedure minimized the volume of evacuation water which was generated. Personnel ensured water quality parameters had stabilized in each well prior to sample collection.

An obstruction in the well casing was encountered in monitoring well (MW-) 2, a two-inch well installed by MDNR, at the approximate 150 foot depth, which did not allow personnel to extend the submersible pump to the screened depth for evacuation. Personnel were able to reach the bottom of the well with a clean, disposable bailer and clean rope, which was used to complete evacuation and sampling.

With HWP personnel's knowledge and permission, ESP collected two grab samples for volatile organics analyses from MW-4 to tentatively compare the effects varying collection methods have on analytical results. One sample (991461) was collected using the submersible pump and the second sample (991462) was collected using a bailer. There were no apparent significant discrepancies noted in the analytical results of the two samples that could be attributed to the collection methods.

MW-3 was evacuated dry after approximately 20 gallons were removed (1 well volume was calculated to be 11 gallons). Therefore, the well was allowed to recharge sufficiently, and the grab sample was collected with a bailer.

ESP personnel collected two sets of 40-ml vials for volatile organics analyses on all water grab samples collected on January 6-7, 1999. The first set of vials in each sample was submitted for volatile organics analyses using the standard practical quantitation limits for water samples (as specified in the QAPP). Per a request from HWP, in the event contaminant levels in a given sample were low enough, the second set of vials was analyzed to realize the lower drinking water detection limits.

All samples collected from public and private wells were noted to be clear and colorless. The descriptions of samples collected from monitoring wells were noted as follows (turbidity was determined in the field and is reported in nephelometric units (NTUs)). There were no separate, free-phase liquids noted in any of the water grab samples.

MW-1	Slightly cloudy (143 NTUs) and light white in color.
MW-2	Cloudy (372 NTUs) and light white in color.
MW-3	Cloudy (951 NTUs) and light reddish-brown in color.
MW-4	Slightly cloudy (86.6 NTUs) and light brown in color.
MW-5	Cloudy (456 NTUs) and transparent white in color.

Refer to Table 3 for monitoring well information.

6.3 Soil Sampling

During the MIP investigation and soil sampling, personnel generally encountered refusal at depths ranging from five to six feet at the former lagoon. A total of ten MIP borings were performed in and around the former lagoon during the field activities. Samples were collected from specific MIP locations based upon the soil gas data generated and the boring locations relative to the areas of concern. Soil samples collected were generally noted to consist of reddish-brown cherty clays with varying amounts of gravel interspersed. Due to the nature of the matrix, sample homogenization was difficult.

Personnel unsuccessfully attempted to collect depth-discrete sediment/soil samples of the intermittent drainage which receives surface drainage from the former lagoon area (as proposed in the sampling plan). Due to the gravel/rock matrix of the drainage bed, no adequate samples could be collected.

Refer to Appendix B for the MIP data logs generated for each boring and the site map for the MIP boring and soil sampling locations. The logs indicate detections noted on the MIP's PID, identified as "Detector 1" and the flame ionization detector "Detector 2".

7.0 Analytical Results

The analytical results of samples collected are attached as Appendix C.

Submitted by:

Brian J. Allen
Environmental Specialist
Superfund/RCRA Unit
Environmental Services Program

Date: 3/12/99

Approved by:

James H. Long
Director
Environmental Services Program

JHL:bac

c: Valerie Wilder, Environmental Specialist, HWP
Robert Hentges, Regional Director, JCRO

TABLES
Former Hulett Lagoon Site
Camdenton, Missouri

Table 1
Former Hulett Lagoon Site
Sample Listing

Sample #	Sample Media/Type	Location Collected	Date/Time Collected
991450	QA/QC sample (Trip blank)	ESP laboratory	1/5/99
991451	Water grab	Paul Buckwalter residential well (Box 45A Normac Estates, Camdenton, MO), located apparently downgradient of the former Hulett Lagoon approximately 2 miles Sample collected after approximately 5 minutes evacuation	1/6/99 @ 1025
991452	Water grab	Dave Burnau residential well (178 Sunset Drive, Camdenton, MO), located directly north (across the street) of Modine Manufacturing Sample collected after approximately 5 minutes evacuation time.	1/6/99 @ 1105
991453	QA/QC sample (Duplicate)	Duplicate sample of 991452	1/6/99 @ 1105
991458	Water grab	City of Camdenton municipal well #4 (AKA "Blair" well) Sample collected after approximately 5 minutes evacuation time	1/6/99 @ 1305
991459	Water grab	City of Camdenton municipal well known as the "Mulberry" well Sample collected after approximately 5 minutes evacuation time	1/6/99 @ 1325
991460	Water grab	Monitoring well (MW-) 3, located on the south edge of the Modine Manufacturing facility lot, southwest of the facility building	1/6/99 @ 1530
991461	Water grab	MW-4, located at the main entrance to Modine Manufacturing All sample analytes collected using a submersible pump.	1/6/99 @ 1650
991462	Water grab	MW-4. Sample submitted for volatile organics analyses and collected with a bailer. Sample was collected to compare results with 991461 analytical results for volatile organics.	1/6/99 @ 1720
991463	Water grab	MW-2, located on the northeast side of the Modine Manufacturing facility building Sample was collected with a bailer.	1/7/99 @ 0940
991464	Water grab	MW-1, located in the western gravel parking lot of the Modine Manufacturing facility property. Sample was collected with a bailer.	1/7/99 @ 1100
991465	Water grab	MW-5, located adjacent, southwest edge, of the former Hulett Lagoon. Sample was collected with a bailer.	1/7/99 @ 1230
991466	QA/QC sample (Duplicate)	Duplicate sample of 991465.	1/7/99 @ 1230
991467	Soil grab	Boring "Hulett-03", collected from the 3-4 ft depth.	1/21/99 @ 1030
991468	Soil grab	Boring "Hulett-03", collected from the 4.5-5.5 ft depth.	1/21/99 @ 1045
991469	Soil grab	Boring "Hulett-01", collected from the 4 5-5 ft depth	1/21/99 @ 1135
991470	Soil grab	Boring "Hulett-02", collected from the 6 5-7 ft depth.	1/21/99 @ 1205
991471	Soil grab	Boring "Hulett-04", collected from the 7.5-8 ft depth.	1/21/99 @ 1355
991472	Soil grab	Boring "Hulett-07", collected from the 5.5-6 ft depth.	1/21/99 @ 1450
991473	Soil grab	Boring "Hulett-09", collected from the 6-7 ft depth	1/21/99 @ 1605
991474	QA/QC sample (Replicate)	Replicate sample of 991473	1/21/99 @ 1605
991475	Soil grab	Boring "Hulett-10", collected from the 10 5-11 ft depth	1/21/99 @ 1630

Table 2
Former Hulett Lagoon Site
GPS Data Points

GPS Identification	Location/ Description	Latitude (Degrees N)	Longitude (Degrees W)	ArcView Data Points (UTM)	
				Easting	Northing
A010619A	"Blair" municipal well	+38 001726°	-92.760299°	521045	4206034
A010619B	"Mulberry" municipal well	+38.008235°	-92.754798°	521526	4206757
A010620A	MW-3 Modine Mfr.	+38.008161°	-92.757634°	521277	4206748
A010623A	MW-4 Modine Mfr.	+38 009836°	-92.757792°	521262	4206934
A010714A	MW-2 Modine Mfr.	+38.009324°	-92.756490°	521377	4206877
A010716A	MW-1 Modine Mfr	+38.009287°	-92 758428°	521207	4206873
A010717A	MW-5 Former lagoon	+38.011261°	-92.755284°	521482	4207093
A010617A	Burnau residential well	+38 010320°	-92.757711°	521269	4206988
A010519A	Buckwalter residential well	+38 000833°	-92.786944°	521269	4206988
A012115A	Boring "Hulett 01"	+38 011315°	-92 755011°	521506	4207099
A012115B	Boring "Hulett 02"	+38.011403°	-92 754850°	521520	4207109
A012116A	Boring "Hulett 03"	+38.011508°	-92 754867°	521519	4207120
A012119A	Boring "Hulett 04"	+38.011421°	-92.754655°	521496	4207096
A012120A	Boring "Hulett 05"	+38.011291°	-92.755130°	521495	4207109
A012120B	Boring "Hulett 06"	+38 011406°	-92.755135°	521505	4207120
A012120C	Boring "Hulett 07"	+38 011507°	-92.755024°	521487	4207123
A012120D	Boring "Hulett 08"	+38.011531°	-92.755222°	521481	4207106
A012121A	Boring "Hulett 09"	+38 010986°	-92 754827°	521537	4207111
A012122A	Boring "Hulett 10"	+38 011379°	-92 755299°	521522	4207062

Table 3
Former Hulett Lagoon Site
Monitoring Well Data

Well Identification	Diameter (inches)/ Riser construction	Total well depth (feet) from TOC	Depth to water (feet) from TOC	Water column (feet)	One well volume (gallons)
MW-1	2" PVC	161' (per well log)	153.22	7.78	1.2
MW-2	2" PVC	197' (per well log)	165.72	31.28	5.1
MW-3	4" Metal	170' (per well log)	153.12	16.88	11
MW-4	4" Metal	194.3' (per well log)	158.55	35.75	23.3
MW-5	2" PVC	120.4' (field determined)	102.75	17.65	2.8

APPENDIX A
Site Maps
Former Hulett Lagoon Site
Camdenton, Missouri

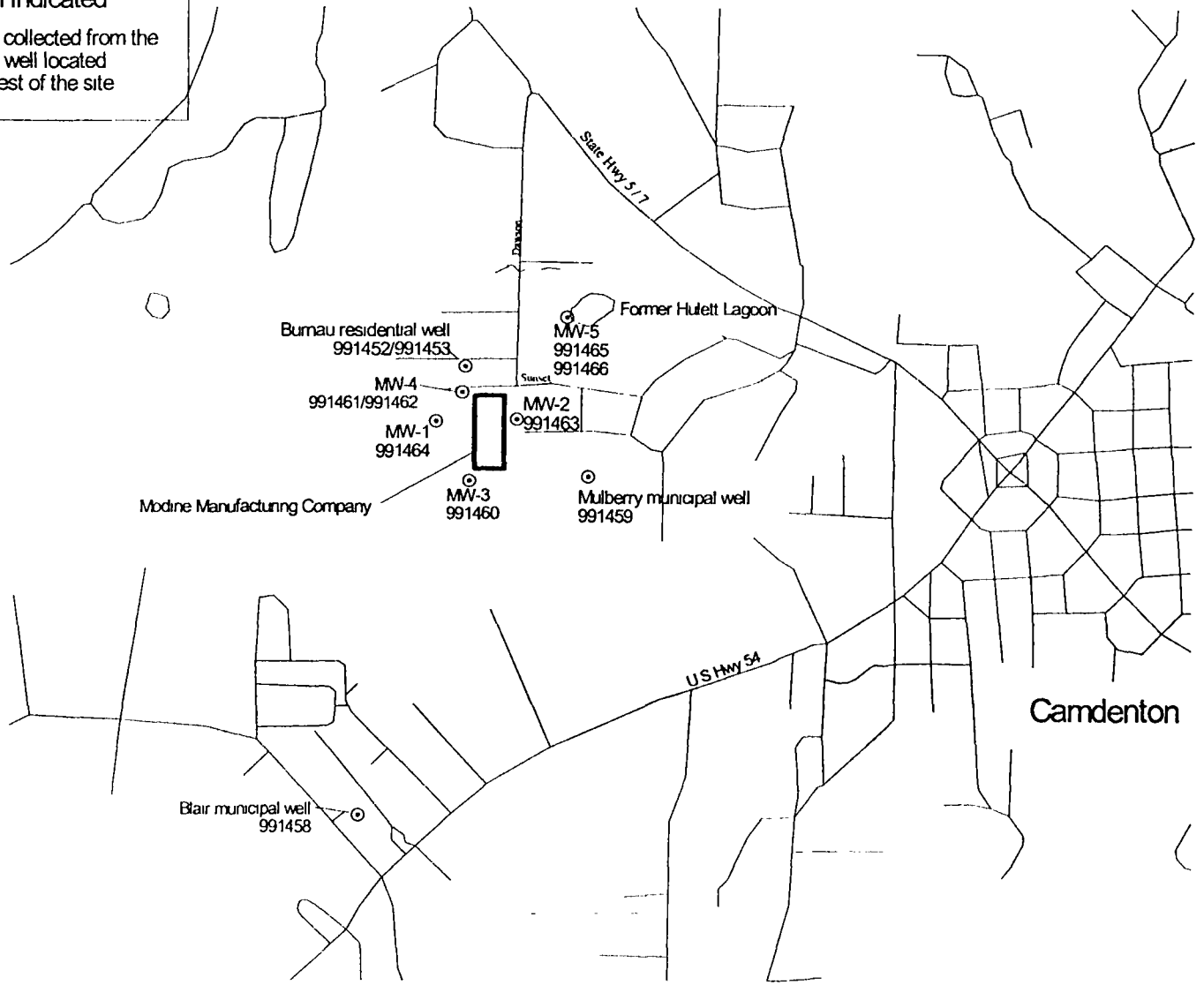
Hulett Lagoon Site
Well Sampling Locations

Legend:

⊙ Wells

99XXXX Sample collected at location indicated

Note: Sample 991451 was collected from the Paul Buckwalter residential well located in Normac Estates, southwest of the site and off the map scale



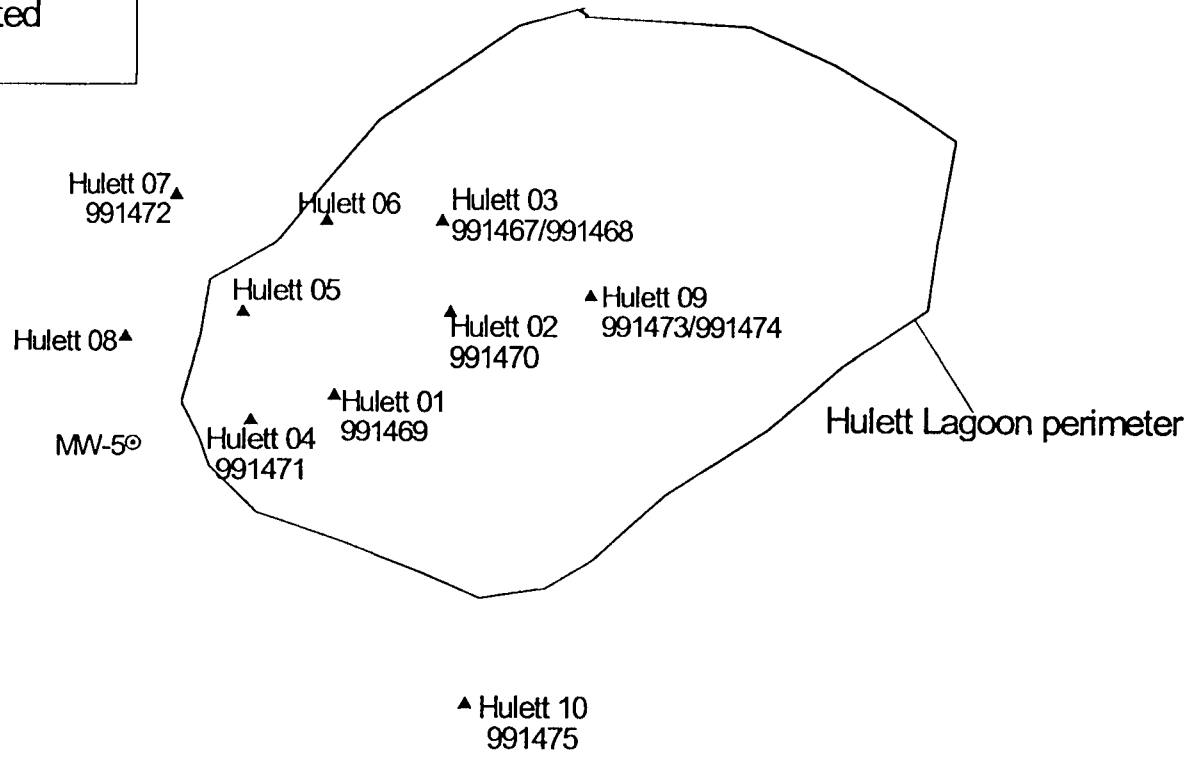
N
W E
S

0.5 0 0.5 Miles

Hulett Lagoon Site
Soil Sampling Locations

Legend:

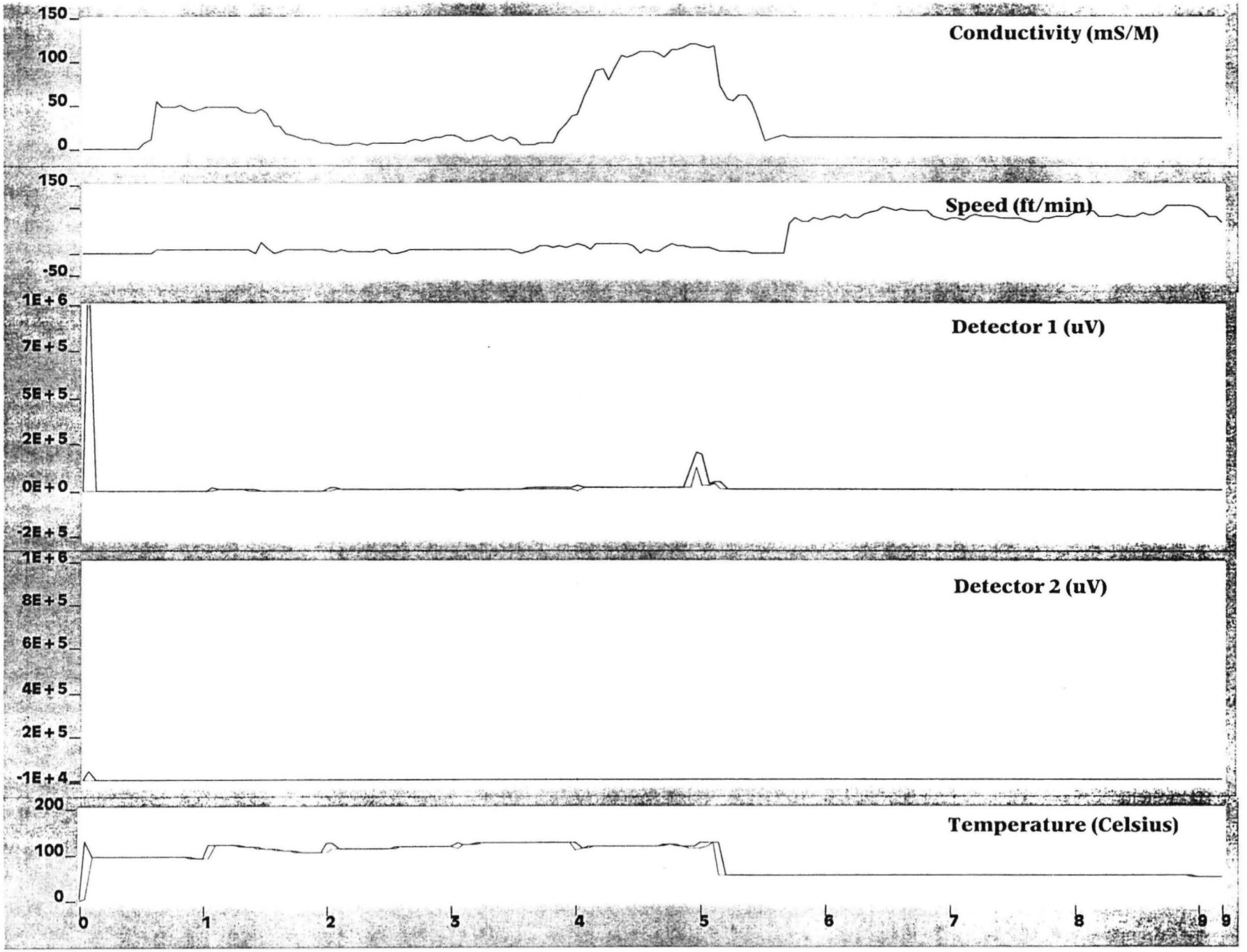
▲	MIP/Soil boring locations/ identifications
⊙	Monitoring well location/ identification
99XXXX	Sample collected at location indicated



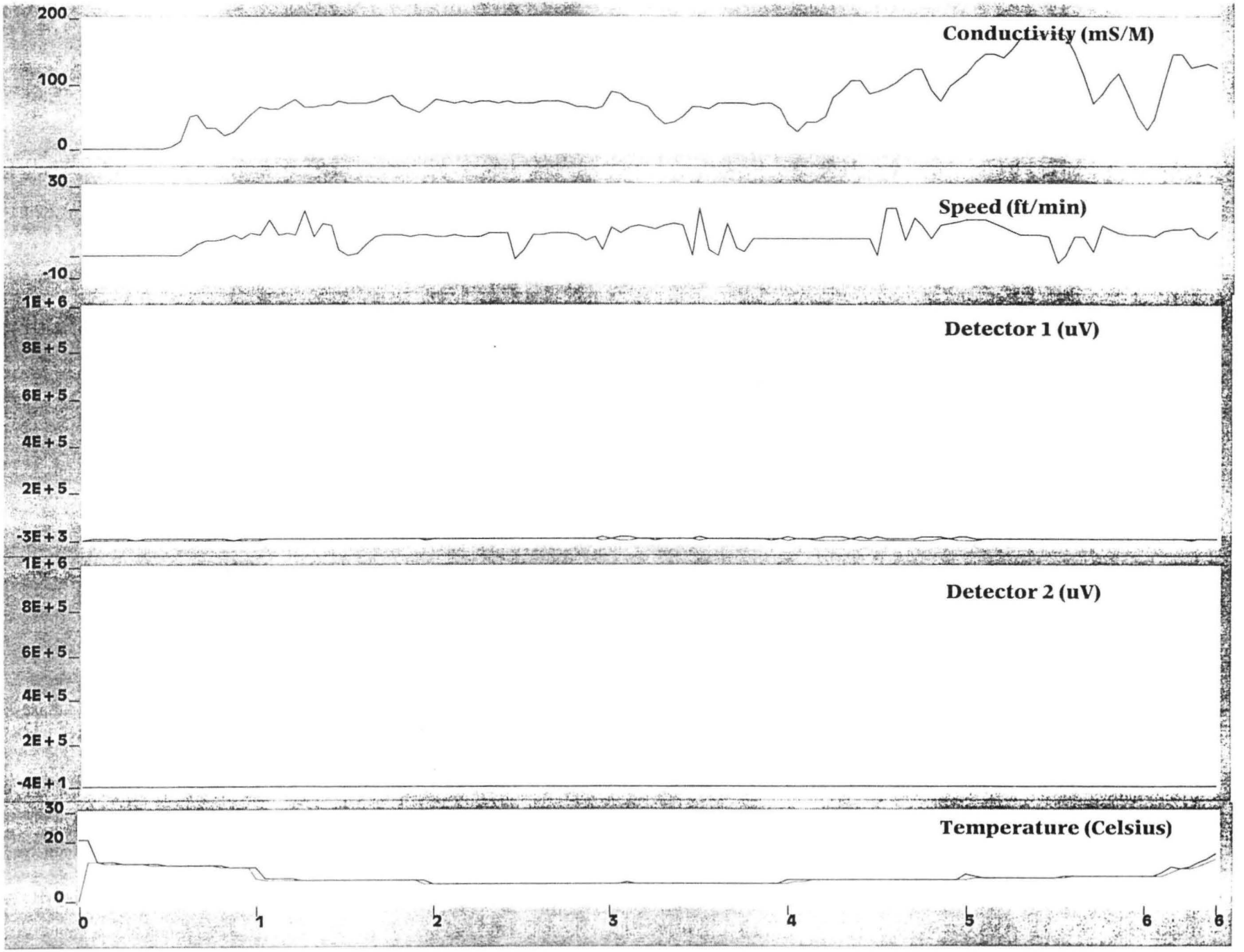
300 0 300 Feet

APPENDIX B
MIP Data Logs
Former Hulett Lagoon Site
Camdenton, Missouri

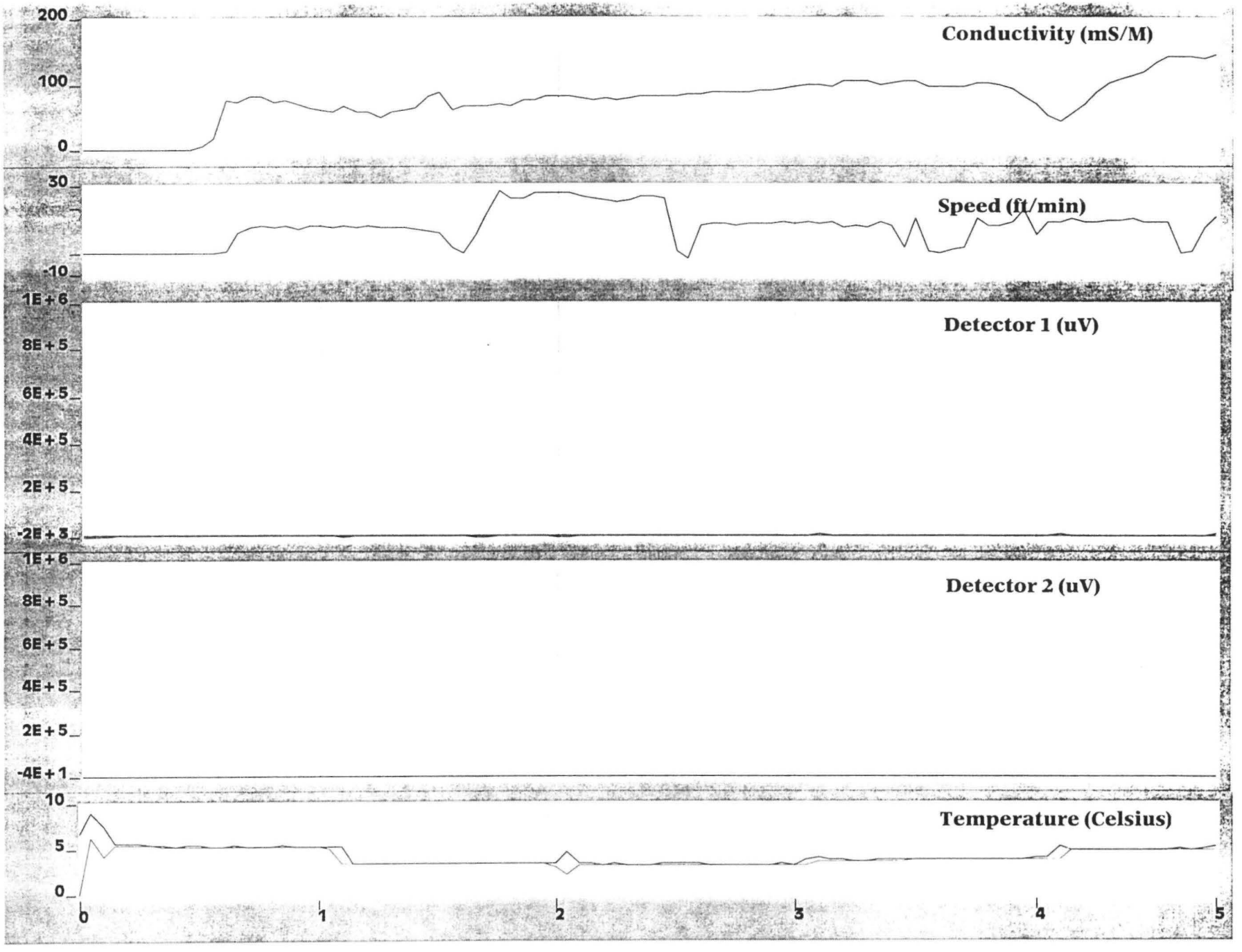
Log: C:\DIRIM95\LOGFILES\Hulett01.dat



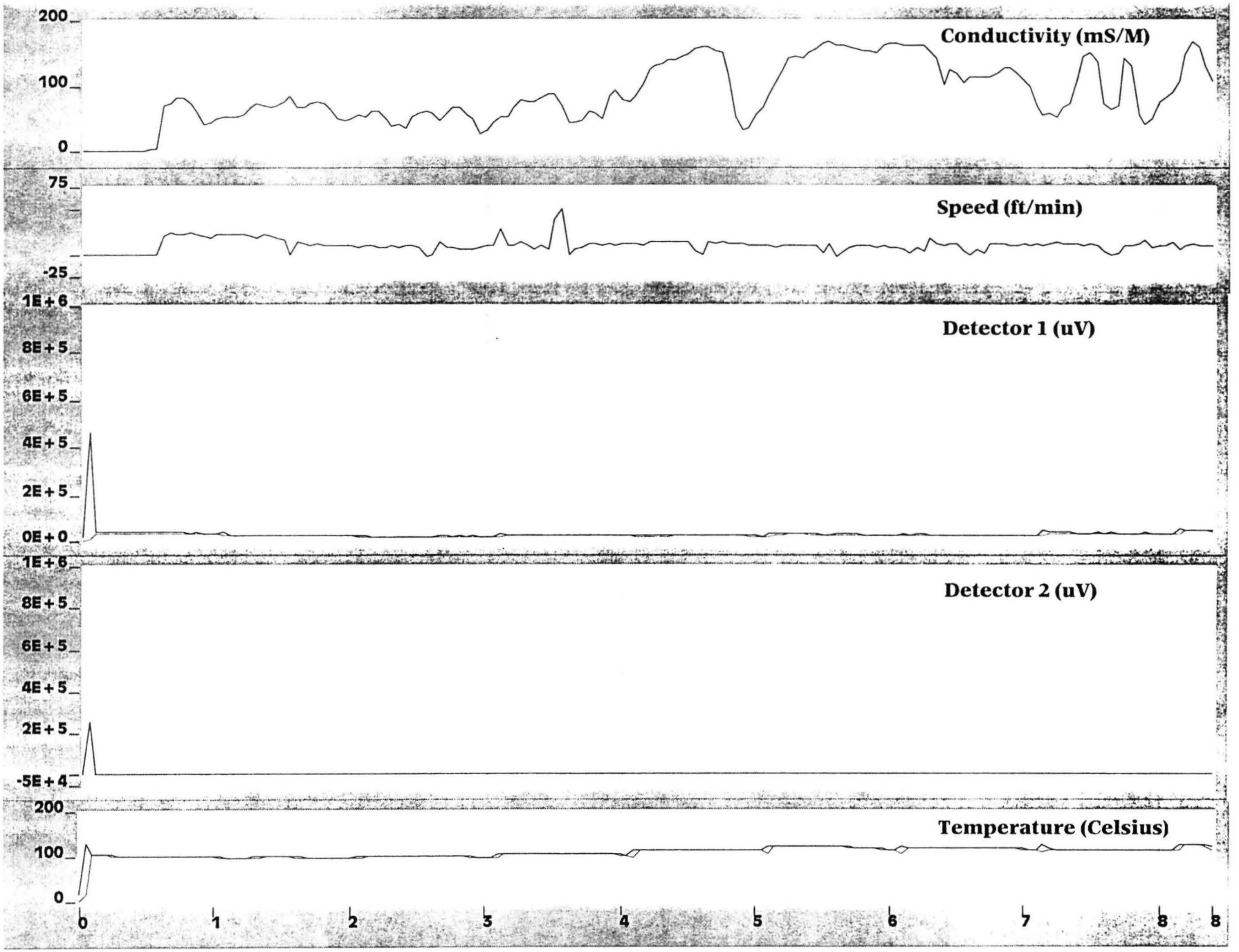
Log: C.\DIRIM95\LOGFILES\Hulett02.dat



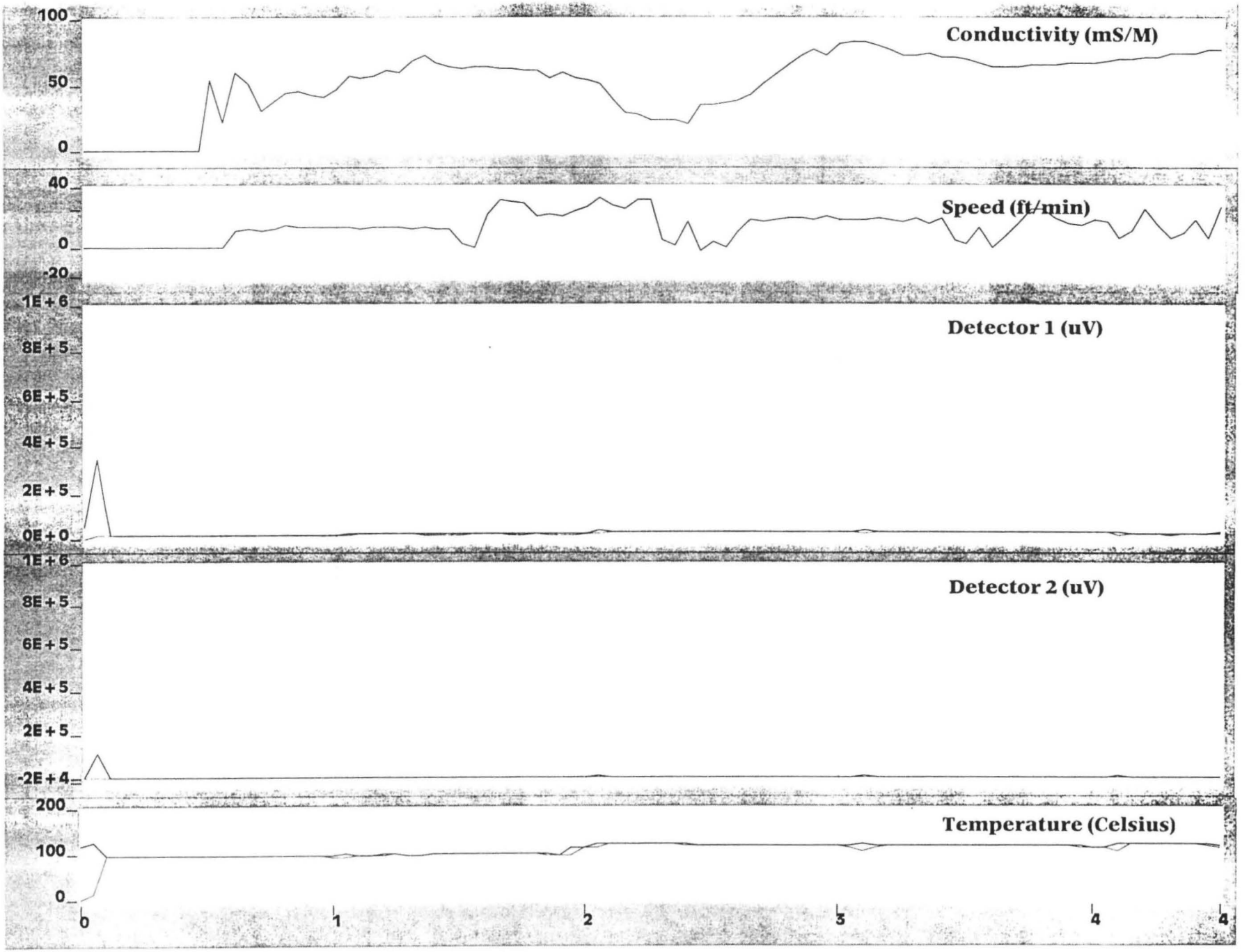
Log: C:\DIRIM95\LOGFILES\Hulett03.dat



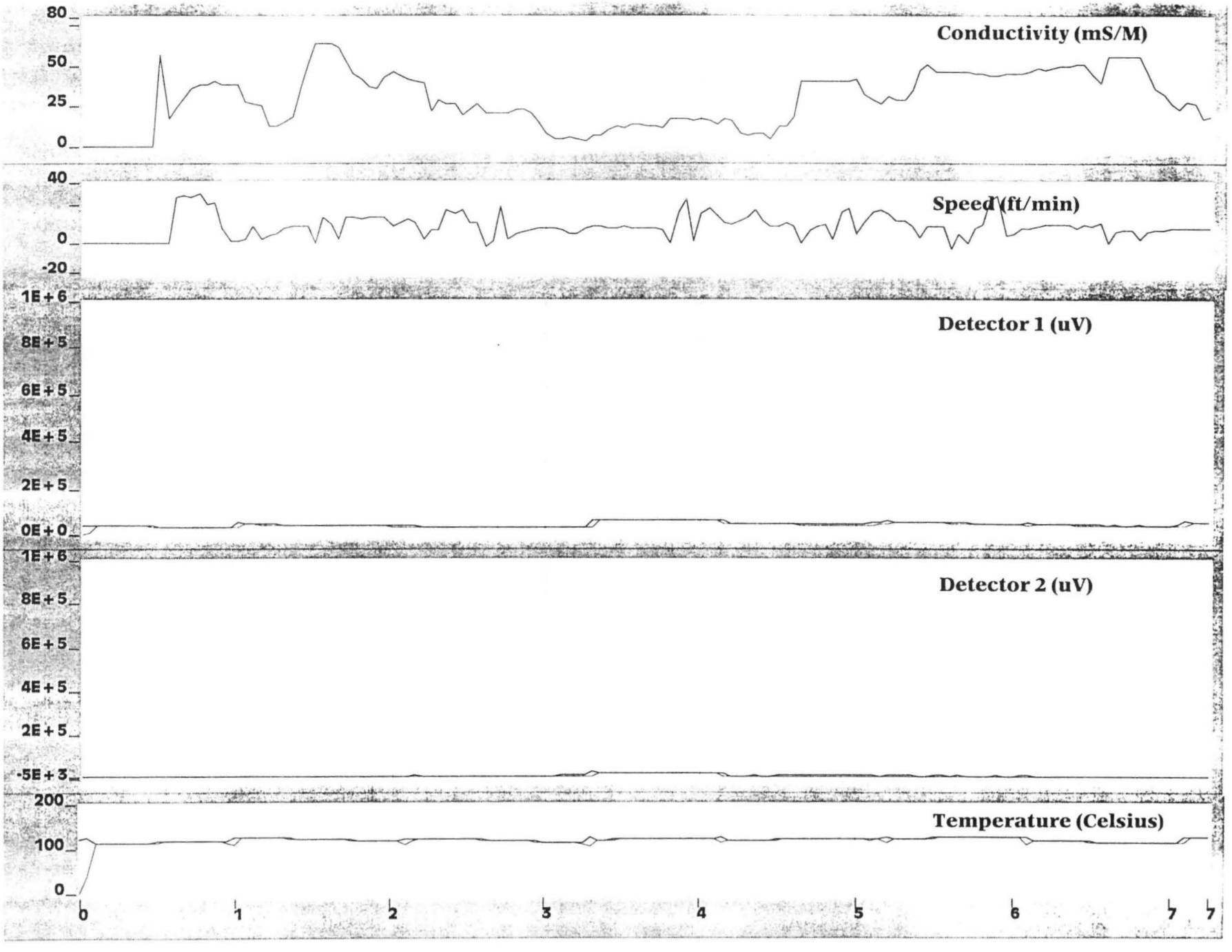
Log: C:\DIRIM95\LOGFILES\Hulett04.dat



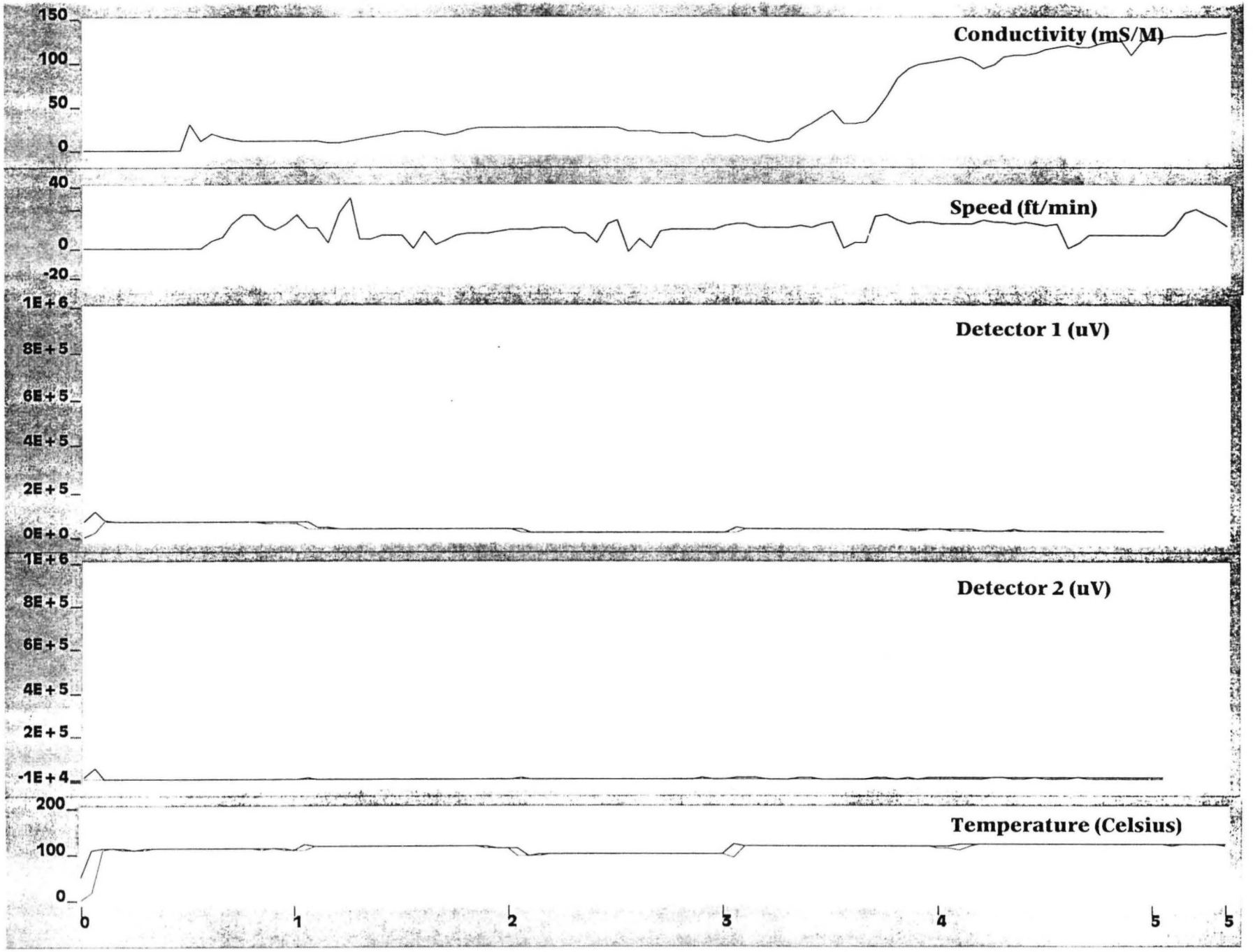
Log: C:\DIRIM95\LOGFILES\Hulett05.dat



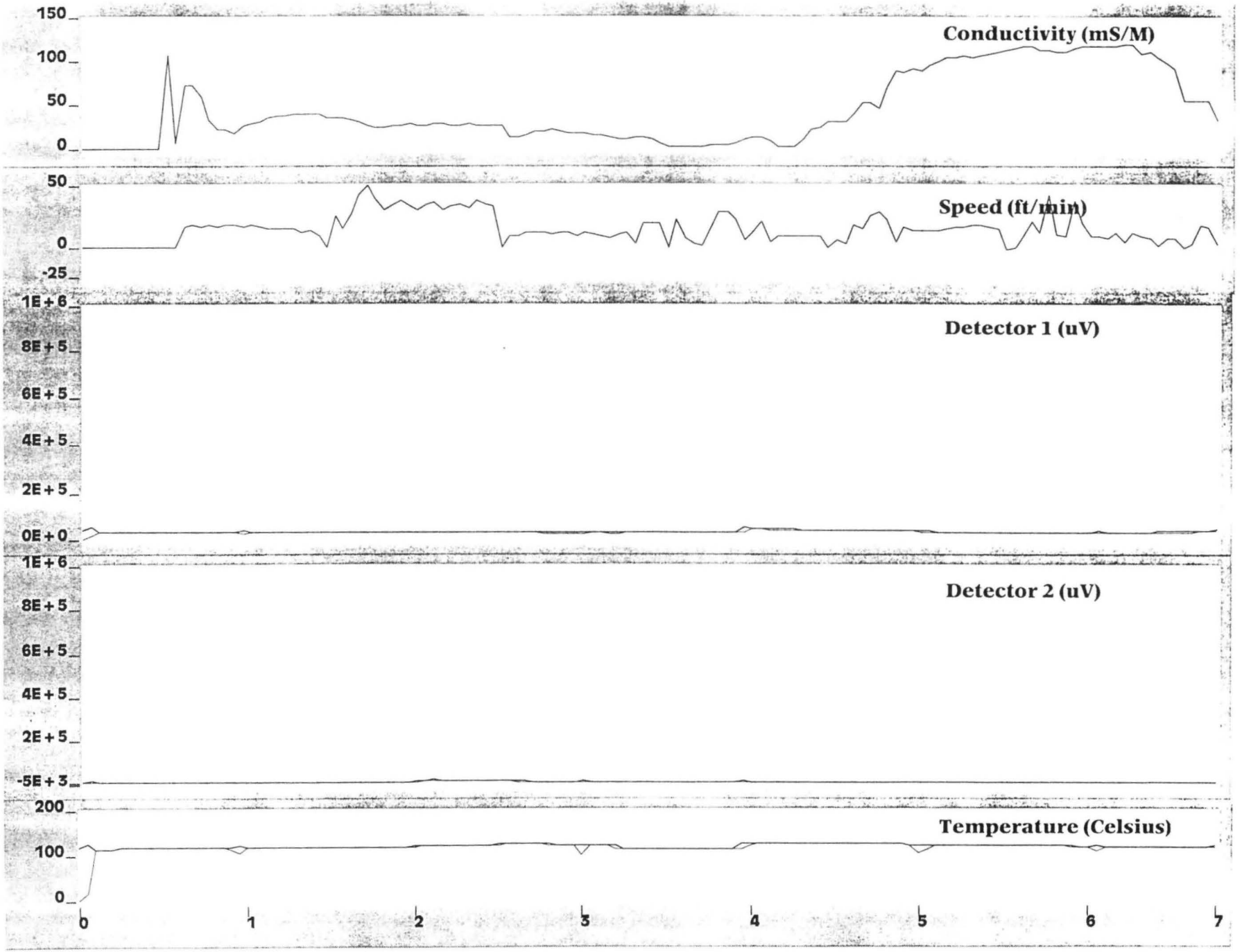
Log: C:\...IRIM95\LOGFILES\Hulett06.dat



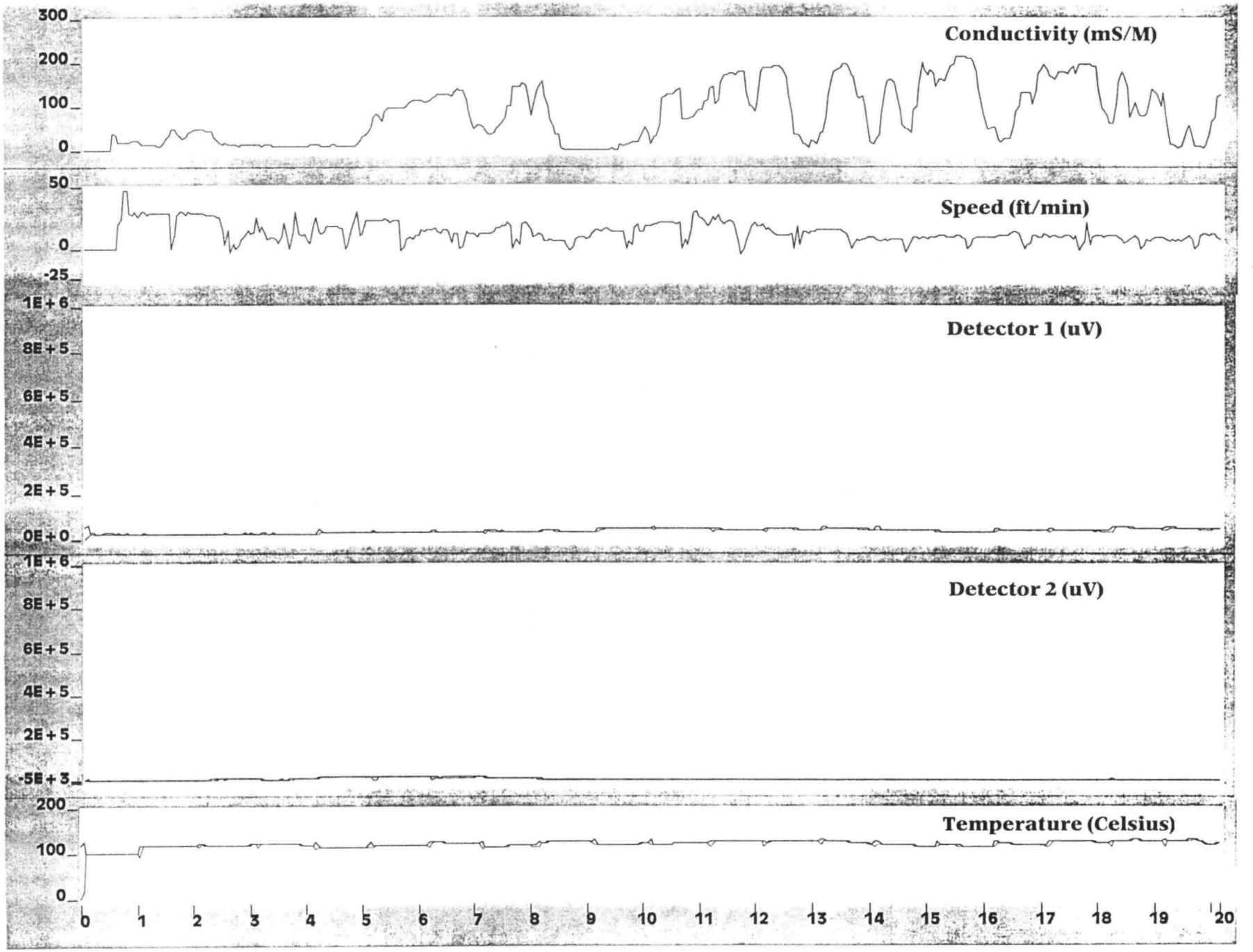
Log: C:\DIRIM95\LOGFILES\Hulett07.dat



Log: C:\DRIM95\LOGFILES\Hulett08.dat



Log: C:\DIRIM95\LOGFILES\Hulett09.dat



APPENDIX C
Analytical Results
Former Hulett Lagoon Site
Camdenton, Missouri

STATE OF MISSOURI
Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991450
Lab Number: 99-D9

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 1/26/99
Date Collected: 1/ 5/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: TRIP BLANK
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
VOC Results:				
Dichlorodifluoromethane	< 200	ug/L	1/12/99	502.2
Chloromethane	< 2.5	ug/L	1/12/99	502.2
Vinyl Chloride	< 0.5	ug/L	1/12/99	502.2
Bromomethane	< 9.0	ug/L	1/12/99	502.2
Chloroethane	< 2.5	ug/L	1/12/99	502.2
Trichlorofluoromethane	< 2.5	ug/L	1/12/99	502.2
1,1-Dichloroethene	< 0.5	ug/L	1/12/99	502.2
Methylene Chloride	< 0.5	ug/L	1/12/99	502.2
Methyl-tert-butyl ether	< 2.0	ug/L	1/12/99	502.2
trans-1,2-Dichloroethene	< 0.5	ug/L	1/12/99	502.2
1,1-Dichloroethane	< 1.0	ug/L	1/12/99	502.2
2,2-Dichloropropane	< 1.0	ug/L	1/12/99	502.2
cis-1,2-Dichloroethene	< 0.5	ug/L	1/12/99	502.2
Chloroform	4.6	ug/L	1/12/99	502.2
Bromochloromethane	< 1.0	ug/L	1/12/99	502.2
1,1,1-Trichloroethane	< 0.5	ug/L	1/12/99	502.2
1,1-Dichloropropene	< 1.0	ug/L	1/12/99	502.2
Carbon Tetrachloride	< 0.5	ug/L	1/12/99	502.2
Benzene	< 0.5	ug/L	1/12/99	502.2
1,2-Dichloroethane	< 0.5	ug/L	1/12/99	502.2
Trichloroethene	< 0.5	ug/L	1/12/99	502.2
1,2-Dichloropropane	< 0.5	ug/L	1/12/99	502.2
Bromodichloromethane	< 0.5	ug/L	1/12/99	502.2
Dibromomethane	< 1.0	ug/L	1/12/99	502.2

Recycled Paper

Analysis Performed	Results		Analyzed	Method
cis-1,3-Dichloropropane	< 2.0	ug/L	1/12/99	502.2
Toluene	< 0.6	ug/L	1/12/99	502.2
trans-1,3-Dichloropropane	< 1.0	ug/L	1/12/99	502.2
1,1,2-Trichloroethane	< 0.5	ug/L	1/12/99	502.2
Tetrachloroethene	< 0.5	ug/L	1/12/99	502.2
1,3-Dichloropropane	< 2.0	ug/L	1/12/99	502.2
Dibromochloromethane	< 0.5	ug/L	1/12/99	502.2
1,2-Dibromoethane	< 2.0	ug/L	1/12/99	502.2
Chlorobenzene	< 0.5	ug/L	1/12/99	502.2
Ethylbenzene	< 0.5	ug/L	1/12/99	502.2
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1/12/99	502.2
Total Xylenes	< 0.5	ug/L	1/12/99	502.2
Styrene	< 0.5	ug/L	1/12/99	502.2
Isopropylbenzene	< 2.0	ug/L	1/12/99	502.2
Bromoform	< 0.5	ug/L	1/12/99	502.2
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1/12/99	502.2
1,2,3-Trichloropropane	< 1.0	ug/l	1/12/99	502.2
n-Propylbenzene	< 2.0	ug/L	1/12/99	502.2
Bromobenzene	< 1.0	ug/L	1/12/99	502.2
2-Chlorotoluene	< 2.0	ug/L	1/12/99	502.2
4-Chlorotoluene	< 2.0	ug/L	1/12/99	502.2
1,3,5-Trimethylbenzene	< 2.0	ug/L	1/12/99	502.2
tert-Butylbenzene	< 2.0	ug/L	1/12/99	502.2
1,2,4-Trimethylbenzene	< 1.0	ug/L	1/12/99	502.2
sec-Butylbenzene	< 2.0	ug/L	1/12/99	502.2
p-isopropyltoluene	< 2.0	ug/L	1/12/99	502.2
1,3-Dichlorobenzene	< 1.0	ug/L	1/12/99	502.2
1,4-Dichlorobenzene	< 0.5	ug/L	1/12/99	502.2
n-Butylbenzene	< 2.0	ug/L	1/12/99	502.2
1,2-Dichlorobenzene	< 0.5	ug/L	1/12/99	502.2
1,2-Dibromo-3-Chloroprop	< 5.0	ug/L	1/12/99	502.2
1,2,4-Trichlorobenzene	< 0.5	ug/L	1/12/99	502.2
Hexachlorobutadiene	< 1.0	ug/L	1/12/99	502.2
Naphthalene	< 20.0	ug/L	1/12/99	502.2
1,2,3-Trichlorobenzene	< 2.0	ug/L	1/12/99	502.2

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991451
Lab Number: 99-D10

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 6/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: WATER GRAB OF PAUL BUCKWALTER RESIDENTIAL WELL (BOX 45A, NORMAC ESTATES)
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Specific Conductivity	918	umhos/cm	1/ 6/99	120.1
Comment: Analyzed in field				
pH	7.03		1/ 6/99	150.1
Comment: Analyzed in field				
Temperature - C	15	Degrees C	1/ 6/99	
Comment: Analyzed in field				
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	62.8	ug/L	1/13/99	200.7
Cadmium, Total	< 1.00	ug/L	1/13/99	200.7
Chromium, Total	< 2.00	ug/L	1/13/99	200.7
Copper, Total	44.7	ug/L	1/13/99	200.7
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	< 3.00	ug/L	1/13/99	200.7
Lead, Total	< 2.5	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOC Results:				
Dichlorodifluoromethane	< 200	ug/L	1/12/99	502.2
Chloromethane	< 2.5	ug/L	1/12/99	502.2
Vinyl Chloride	< 0.5	ug/L	1/12/99	502.2
Bromomethane	< 9.0	ug/L	1/12/99	502.2
Chloroethane	< 2.5	ug/L	1/12/99	502.2
Trichlorofluoromethane	< 2.5	ug/L	1/12/99	502.2

Recycled Paper

Lab Number: 99-D10
Sample Number: 991451
February 10, 1999

Analysis Performed	Results		Analyzed	Method
1,1-Dichloroethene	< 0.5	ug/L	1/12/99	502.2
Methylene Chloride	< 0.5	ug/L	1/12/99	502.2
Methyl-tert-butyl ether	< 2.0	ug/L	1/12/99	502.2
trans-1,2-Dichloroethene	< 0.5	ug/L	1/12/99	502.2
1,1-Dichloroethane	< 1.0	ug/L	1/12/99	502.2
2,2-Dichloropropane	< 1.0	ug/L	1/12/99	502.2
cis-1,2-Dichloroethene	< 0.5	ug/L	1/12/99	502.2
Chloroform	< 0.5	ug/L	1/12/99	502.2
Bromochloromethane	< 1.0	ug/L	1/12/99	502.2
1,1,1-Trichloroethane	< 0.5	ug/L	1/12/99	502.2
1,1-Dichloropropene	< 1.0	ug/L	1/12/99	502.2
Carbon Tetrachloride	< 0.5	ug/L	1/12/99	502.2
Benzene	< 0.5	ug/L	1/12/99	502.2
1,2-Dichloroethane	< 0.5	ug/L	1/12/99	502.2
Trichloroethene	< 0.5	ug/L	1/12/99	502.2
1,2-Dichloropropane	< 0.5	ug/L	1/12/99	502.2
Bromodichloromethane	< 0.5	ug/L	1/12/99	502.2
Dibromomethane	< 1.0	ug/L	1/12/99	502.2
cis-1,3-Dichloropropane	< 2.0	ug/L	1/12/99	502.2
Toluene	< 0.6	ug/L	1/12/99	502.2
trans-1,3-Dichloropropane	< 1.0	ug/L	1/12/99	502.2
1,1,2-Trichloroethane	< 0.5	ug/L	1/12/99	502.2
Tetrachloroethene	< 0.5	ug/L	1/12/99	502.2
1,3-Dichloropropane	< 2.0	ug/L	1/12/99	502.2
Dibromochloromethane	< 0.5	ug/L	1/12/99	502.2
1,2-Dibromoethane	< 2.0	ug/L	1/12/99	502.2
Chlorobenzene	< 0.5	ug/L	1/12/99	502.2
Ethylbenzene	< 0.5	ug/L	1/12/99	502.2
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1/12/99	502.2
Total Xylenes	< 0.5	ug/L	1/12/99	502.2
Styrene	< 0.5	ug/L	1/12/99	502.2
Isopropylbenzene	< 2.0	ug/L	1/12/99	502.2
Bromoform	< 0.5	ug/L	1/12/99	502.2
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1/12/99	502.2
1,2,3-Trichloropropane	< 1.0	ug/l	1/12/99	502.2
n-Propylbenzene	< 2.0	ug/L	1/12/99	502.2
Bromobenzene	< 1.0	ug/L	1/12/99	502.2
2-Chlorotoluene	< 2.0	ug/L	1/12/99	502.2
4-Chlorotoluene	< 2.0	ug/L	1/12/99	502.2
1,3,5-Trimethylbenzene	< 2.0	ug/L	1/12/99	502.2
tert-Butylbenzene	< 2.0	ug/L	1/12/99	502.2
1,2,4-Trimethylbenzene	< 1.0	ug/L	1/12/99	502.2
sec-Butylbenzene	< 2.0	ug/L	1/12/99	502.2
p-isopropyltoluene	< 2.0	ug/L	1/12/99	502.2
1,3-Dichlorobenzene	< 1.0	ug/L	1/12/99	502.2
1,4-Dichlorobenzene	< 0.5	ug/L	1/12/99	502.2
n-Butylbenzene	< 2.0	ug/L	1/12/99	502.2
1,2-Dichlorobenzene	< 0.5	ug/L	1/12/99	502.2

Analysis Performed	Results		Analyzed	Method
1,2-Dibromo-3-Chloroprop	< 5.0	ug/L	1/12/99	502.2
1,2,4-Trichlorobenzene	< 0.5	ug/L	1/12/99	502.2
Hexachlorobutadiene	< 1.0	ug/L	1/12/99	502.2
Naphthalene	< 20.0	ug/L	1/12/99	502.2
1,2,3-Trichlorobenzene	< 2.0	ug/L	1/12/99	502.2

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991452
Lab Number: 99-D11

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 6/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF DAVE BURNAN RESIDENTIAL WELL (178 SUNSET DR), LOCATED DIRECTLY NORTH OF MODINE MFG
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Specific Conductivity	649	umhos/cm	1/ 6/99	120.1
Comment: Analyzed in field				
pH	7.55		1/ 6/99	150.1
Comment: Analyzed in field				
Temperature - C	12	Degrees C	1/ 6/99	
Comment: Analyzed in field				
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	67.5	ug/L	1/13/99	200.7
Cadmium, Total	< 1.00	ug/L	1/13/99	200.7
Chromium, Total	< 2.00	ug/L	1/13/99	200.7
Copper, Total	27.5	ug/L	1/13/99	200.7
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	11.2	ug/L	1/13/99	200.7
Lead, Total	< 2.5	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOA Results:				
Chloromethane	< 5.0	ug/L	1/14/99	8260
Vinyl Chloride	< 5.0	ug/L	1/14/99	8260
Bromomethane	< 5.0	ug/L	1/14/99	8260
Chloroethane	< 5.0	ug/L	1/14/99	8260
1,1-Dichloroethene	< 5.0	ug/L	1/14/99	8260
Acetone	< 20.0	ug/L	1/14/99	8260

Recycled Paper

Analysis Performed	Results		Analyzed	Method
Carbon Disulfide	< 5.0	ug/L	1/14/99	8260
Methylene Chloride	< 20.0	ug/L	1/14/99	8260
Methyl Tert-Butyl Ether	< 5.0	ug/L	1/14/99	8260
trans-1,2-Dichloroethene	< 5.0	ug/L	1/14/99	8260
1,1-Dichloroethane	< 5.0	ug/L	1/14/99	8260
2-Butanone	< 20.0	ug/L	1/14/99	8260
cis-1,2-Dichloroethene	13.0	ug/L	1/14/99	8260
Chloroform	< 5.0	ug/L	1/14/99	8260
1,1,1-Trichloroethane	< 5.0	ug/L	1/14/99	8260
Carbon Tetrachloride	< 5.0	ug/L	1/14/99	8260
Benzene	< 5.0	ug/L	1/14/99	8260
1,2-Dichloroethane	< 5.0	ug/L	1/14/99	8260
Trichloroethene	240	ug/L	1/14/99	8260
1,2-Dichloropropane	< 5.0	ug/L	1/14/99	8260
Bromodichloromethane	< 5.0	ug/L	1/14/99	8260
2-Hexanone	< 20.0	ug/L	1/14/99	8260
Trans-1,3-Dichloropropene	< 5.0	ug/L	1/14/99	8260
Toluene	6.1	ug/L	1/14/99	8260
CIS-1,3-Dichloropropene	< 5.0	ug/L	1/14/99	8260
1,1,2-Trichloroethane	< 5.0	ug/L	1/14/99	8260
4-Methyl-2-Pentanone	< 20.0	ug/L	1/14/99	8260
Tetrachloroethene	< 5.0	ug/L	1/14/99	8260
Dibromochloromethane	< 5.0	ug/L	1/14/99	8260
Chlorobenzene	< 5.0	ug/L	1/14/99	8260
Ethylbenzene	5.3	ug/L	1/14/99	8260
Total Xylenes	15.0	ug/L	1/14/99	8260
Styrene	< 5.0	ug/L	1/14/99	8260
Bromoform	< 5.0	ug/L	1/14/99	8260
1,1,2,2-Tetrachloroethane	< 5.0	ug/L	1/14/99	8260
1,3-Dichlorobenzene	< 5.0	ug/L	1/14/99	8260
1,4-Dichlorobenzene	< 5.0	ug/L	1/14/99	8260
1,2-Dichlorobenzene	< 5.0	ug/L	1/14/99	8260

VOA Comments:
A 1:2 dilution was employed to quantitate TCE.

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991453
Lab Number: 99-D12

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 6/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF DAVE BURNAN RESIDENTIAL WELL (178 SUNSET DR), LOCATED DIRECTLY NORTH OF MODINE MFG,(DUPL)
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Specific Conductivity	649	umhos/cm	1/ 6/99	120.1
Comment: Analyzed in field				
pH	7.55		1/ 6/99	150.1
Comment: Analyzed in field				
Temperature - C	12	Degrees C	1/ 6/99	
Comment: Analyzed in field				
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	66.6	ug/L	1/13/99	200.7
Cadmium, Total	< 1.00	ug/L	1/13/99	200.7
Chromium, Total	< 2.00	ug/L	1/13/99	200.7
Copper, Total	16.3	ug/L	1/13/99	200.7
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	60.4	ug/L	1/13/99	200.7
Lead, Total	< 2.5	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOA Results:				
Chloromethane	< 5.0	ug/L	1/14/99	8260
Vinyl Chloride	< 5.0	ug/L	1/14/99	8260
Bromomethane	< 5.0	ug/L	1/14/99	8260
Chloroethane	< 5.0	ug/L	1/14/99	8260
1,1-Dichloroethene	< 5.0	ug/L	1/14/99	8260
Acetone	< 20.0	ug/L	1/14/99	8260

Recycled Paper

Lab Number: 99-D12
Sample Number: 991453
February 10, 1999

Analysis Performed	Results		Analyzed	Method
Carbon Disulfide	< 5.0	ug/L	1/14/99	8260
Methylene Chloride	< 20.0	ug/L	1/14/99	8260
Methyl Tert-Butyl Ether	< 5.0	ug/L	1/14/99	8260
trans-1,2-Dichloroethene	< 5.0	ug/L	1/14/99	8260
1,1-Dichloroethane	< 5.0	ug/L	1/14/99	8260
2-Butanone	< 20.0	ug/L	1/14/99	8260
cis-1,2-Dichloroethene	13.0	ug/L	1/14/99	8260
Chloroform	< 5.0	ug/L	1/14/99	8260
1,1,1-Trichloroethane	< 5.0	ug/L	1/14/99	8260
Carbon Tetrachloride	< 5.0	ug/L	1/14/99	8260
Benzene	< 5.0	ug/L	1/14/99	8260
1,2-Dichloroethane	< 5.0	ug/L	1/14/99	8260
Trichloroethene	230	ug/L	1/14/99	8260
1,2-Dichloropropane	< 5.0	ug/L	1/14/99	8260
Bromodichloromethane	< 5.0	ug/L	1/14/99	8260
2-Hexanone	< 20.0	ug/L	1/14/99	8260
Trans-1,3-Dichloropropene	< 5.0	ug/L	1/14/99	8260
Toluene	< 5.0	ug/L	1/14/99	8260
CIS-1,3-Dichloropropene	< 5.0	ug/L	1/14/99	8260
1,1,2-Trichloroethane	< 5.0	ug/L	1/14/99	8260
4-Methyl-2-Pentanone	< 20.0	ug/L	1/14/99	8260
Tetrachloroethene	< 5.0	ug/L	1/14/99	8260
Dibromochloromethane	< 5.0	ug/L	1/14/99	8260
Chlorobenzene	< 5.0	ug/L	1/14/99	8260
Ethylbenzene	< 5.0	ug/L	1/14/99	8260
Total Xylenes	< 5.0	ug/L	1/14/99	8260
Styrene	< 5.0	ug/L	1/14/99	8260
Bromoform	< 5.0	ug/L	1/14/99	8260
1,1,2,2-Tetrachloroethane	< 5.0	ug/L	1/14/99	8260
1,3-Dichlorobenzene	< 5.0	ug/L	1/14/99	8260
1,4-Dichlorobenzene	< 5.0	ug/L	1/14/99	8260
1,2-Dichlorobenzene	< 5.0	ug/L	1/14/99	8260

VOA Comments:
A 1:2 dilution was employed to quantitate TCE.

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991458
Lab Number: 99-D17

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 6/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF CAMDENTON CITY WELL #4 (BLAIR WELL)
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Specific Conductivity	569	umhos/cm	1/ 6/99	120.1
Comment: Analyzed in field				
pH	7.68		1/ 6/99	150.1
Comment: Analyzed in field				
Temperature - C	16	Degrees C	1/ 6/99	
Comment: Analyzed in field				
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	45.3	ug/L	1/13/99	200.7
Cadmium, Total	< 1.00	ug/L	1/13/99	200.7
Chromium, Total	< 2.00	ug/L	1/13/99	200.7
Copper, Total	21.7	ug/L	1/13/99	200.7
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	< 3.00	ug/L	1/13/99	200.7
Lead, Total	4.4	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOC Results:				
Dichlorodifluoromethane	< 200	ug/L	1/13/99	502.2
Chloromethane	< 2.5	ug/L	1/13/99	502.2
Vinyl Chloride	< 0.5	ug/L	1/13/99	502.2
Bromomethane	< 9.0	ug/L	1/13/99	502.2
Chloroethane	< 2.5	ug/L	1/13/99	502.2
Trichlorofluoromethane	< 2.5	ug/L	1/13/99	502.2
1,1-Dichloroethene	< 0.5	ug/L	1/13/99	502.2

Recycled Paper

Lab Number: 99-D17
Sample Number: 991458
February 10, 1999

Analysis Performed	Results		Analyzed	Method
Methylene Chloride	< 0.5	ug/L	1/13/99	502.2
Methyl-tert-butyl ether	< 2.0	ug/L	1/13/99	502.2
trans-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloroethane	< 1.0	ug/L	1/13/99	502.2
2,2-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
cis-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Chloroform	< 0.5	ug/L	1/13/99	502.2
Bromochloromethane	< 1.0	ug/L	1/13/99	502.2
1,1,1-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloropropene	< 1.0	ug/L	1/13/99	502.2
Carbon Tetrachloride	< 0.5	ug/L	1/13/99	502.2
Benzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dichloroethane	< 0.5	ug/L	1/13/99	502.2
Trichloroethene	< 0.5	ug/L	1/13/99	502.2
1,2-Dichloropropane	< 0.5	ug/L	1/13/99	502.2
Bromodichloromethane	< 0.5	ug/L	1/13/99	502.2
Dibromomethane	< 1.0	ug/L	1/13/99	502.2
cis-1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Toluene	< 0.6	ug/L	1/13/99	502.2
trans-1,3-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
1,1,2-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
Tetrachloroethene	< 0.5	ug/L	1/13/99	502.2
1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Dibromochloromethane	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromoethane	< 2.0	ug/L	1/13/99	502.2
Chlorobenzene	< 0.5	ug/L	1/13/99	502.2
Ethylbenzene	< 0.5	ug/L	1/13/99	502.2
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
Total Xylenes	< 0.5	ug/L	1/13/99	502.2
Styrene	< 0.5	ug/L	1/13/99	502.2
Isopropylbenzene	< 2.0	ug/L	1/13/99	502.2
Bromoform	< 0.5	ug/L	1/13/99	502.2
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
1,2,3-Trichloropropane	< 1.0	ug/l	1/13/99	502.2
n-Propylbenzene	< 10.0	ug/L	1/13/99	502.2
Bromobenzene	< 1.0	ug/L	1/13/99	502.2
2-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
4-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
1,3,5-Trimethylbenzene	< 2.0	ug/L	1/13/99	502.2
tert-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2,4-Trimethylbenzene	< 1.0	ug/L	1/13/99	502.2
sec-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
p-isopropyltoluene	< 2.0	ug/L	1/13/99	502.2
1,3-Dichlorobenzene	< 1.0	ug/L	1/13/99	502.2
1,4-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
n-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromo-3-Chloroprop	< 5.0	ug/L	1/13/99	502.2

Analysis Performed	Results		Analyzed	Method
1,2,4-Trichlorobenzene	< 0.5	ug/L	1/13/99	502.2
Hexachlorobutadiene	< 1.0	ug/L	1/13/99	502.2
Naphthalene	< 20.0	ug/L	1/13/99	502.2
1,2,3-Trichlorobenzene	< 2.0	ug/L	1/13/99	502.2

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991459
Lab Number: 99-D18

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 6/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF CAMDENTON CITY WELL KNOWN AS MULBERRY WELL
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Specific Conductivity	526	umhos/cm	1/ 6/99	120.1
Comment: Analyzed in field				
pH	7.74		1/ 6/99	150.1
Comment: Analyzed in field				
Temperature - C	15	Degrees C	1/ 6/99	
Comment: Analyzed in field				
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	45.3	ug/L	1/13/99	200.7
Cadmium, Total	< 1.00	ug/L	1/13/99	200.7
Chromium, Total	< 2.00	ug/L	1/13/99	200.7
Copper, Total	31.7	ug/L	1/13/99	200.7
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	< 3.00	ug/L	1/13/99	200.7
Lead, Total	15.7	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOC Results:				
Dichlorodifluoromethane	< 200	ug/L	1/13/99	502.2
Chloromethane	< 2.5	ug/L	1/13/99	502.2
Vinyl Chloride	< 0.5	ug/L	1/13/99	502.2
Bromomethane	< 9.0	ug/L	1/13/99	502.2
Chloroethane	< 2.5	ug/L	1/13/99	502.2
Trichlorofluoromethane	< 2.5	ug/L	1/13/99	502.2
1,1-Dichloroethene	< 0.5	ug/L	1/13/99	502.2

Recycled Paper

Lab Number: 99-D18
Sample Number: 991459
February 10, 1999

Analysis Performed	Results		Analyzed	Method
Methylene Chloride	< 0.5	ug/L	1/13/99	502.2
Methyl-tert-butyl ether	< 2.0	ug/L	1/13/99	502.2
trans-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloroethane	< 1.0	ug/L	1/13/99	502.2
2,2-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
cis-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Chloroform	< 0.5	ug/L	1/13/99	502.2
Bromochloromethane	< 1.0	ug/L	1/13/99	502.2
1,1,1-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloropropene	< 1.0	ug/L	1/13/99	502.2
Carbon Tetrachloride	< 0.5	ug/L	1/13/99	502.2
Benzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dichloroethane	< 0.5	ug/L	1/13/99	502.2
Trichloroethene	5.3	ug/L	1/13/99	502.2
1,2-Dichloropropane	< 0.5	ug/L	1/13/99	502.2
Bromodichloromethane	< 0.5	ug/L	1/13/99	502.2
Dibromomethane	< 1.0	ug/L	1/13/99	502.2
cis-1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Toluene	< 0.6	ug/L	1/13/99	502.2
trans-1,3-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
1,1,2-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
Tetrachloroethene	< 0.5	ug/L	1/13/99	502.2
1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Dibromochloromethane	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromoethane	< 2.0	ug/L	1/13/99	502.2
Chlorobenzene	< 0.5	ug/L	1/13/99	502.2
Ethylbenzene	< 0.5	ug/L	1/13/99	502.2
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
Total Xylenes	< 0.5	ug/L	1/13/99	502.2
Styrene	< 0.5	ug/L	1/13/99	502.2
Isopropylbenzene	< 2.0	ug/L	1/13/99	502.2
Bromoform	< 0.5	ug/L	1/13/99	502.2
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
1,2,3-Trichloropropane	< 1.0	ug/l	1/13/99	502.2
n-Propylbenzene	< 10.0	ug/L	1/13/99	502.2
Bromobenzene	< 1.0	ug/L	1/13/99	502.2
2-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
4-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
1,3,5-Trimethylbenzene	< 2.0	ug/L	1/13/99	502.2
tert-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2,4-Trimethylbenzene	< 1.0	ug/L	1/13/99	502.2
sec-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
p-isopropyltoluene	< 2.0	ug/L	1/13/99	502.2
1,3-Dichlorobenzene	< 1.0	ug/L	1/13/99	502.2
1,4-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
n-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromo-3-Chloroprop	< 5.0	ug/L	1/13/99	502.2

Analysis Performed	Results		Analyzed	Method
1,2,4-Trichlorobenzene	< 0.5	ug/L	1/13/99	502.2
Hexachlorobutadiene	< 1.0	ug/L	1/13/99	502.2
Naphthalene	< 20.0	ug/L	1/13/99	502.2
1,2,3-Trichlorobenzene	< 2.0	ug/L	1/13/99	502.2

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991460
Lab Number: 99-D19

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 6/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF MW-3, LOCATED ON SOUTH END OF LOT, SOUTHWEST OF MODINE MANUFACTURING BUILDING
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Turbidity	951	NTU	1/ 6/99	180.1
Comment: Analyzed in field				
Specific Conductivity	701	umhos/cm	1/ 6/99	120.1
Comment: Analyzed in field				
pH	7.48		1/ 6/99	150.1
Comment: Analyzed in field				
Temperature - C	15	Degrees C	1/ 6/99	
Comment: Analyzed in field				
Silver, Dissolved	< 5.00	ug/L	1/13/99	200.7
Arsenic, Dissolved	< 1.2	ug/L	1/14/99	206.2
Barium, Dissolved	69.6	ug/L	1/13/99	200.7
Cadmium, Dissolved	< 1.00	ug/L	1/13/99	200.7
Chromium, Dissolved	< 2.00	ug/L	1/13/99	200.7
Copper, Dissolved	< 3.00	ug/L	1/13/99	200.7
Mercury, Dissolved	< 0.20	ug/L	1/29/99	245.1
Nickel, Dissolved	< 3.00	ug/L	1/13/99	200.7
Lead, Dissolved	< 2.5	ug/L	1/14/99	239.2
Selenium, Dissolved	< 1.0	ug/L	1/14/99	270.2
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	6.0	ug/L	1/14/99	206.2
Barium, Total	151	ug/L	1/13/99	200.7
Cadmium, Total	2.26	ug/L	1/13/99	200.7
Chromium, Total	45.7	ug/L	1/13/99	200.7

Recycled Paper

Analysis Performed	Results		Analyzed	Method
Copper, Total	51.2	ug/L	1/13/99	200.7
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	29.7	ug/L	1/13/99	200.7
Lead, Total	97.6	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOC Results:				
Dichlorodifluoromethane	< 200	ug/L	1/13/99	502.2
Chloromethane	< 2.5	ug/L	1/13/99	502.2
Vinyl Chloride	< 0.5	ug/L	1/13/99	502.2
Bromomethane	< 9.0	ug/L	1/13/99	502.2
Chloroethane	< 2.5	ug/L	1/13/99	502.2
Trichlorofluoromethane	< 2.5	ug/L	1/13/99	502.2
1,1-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Methylene Chloride	< 0.5	ug/L	1/13/99	502.2
Methyl-tert-butyl ether	< 2.0	ug/L	1/13/99	502.2
trans-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloroethane	< 1.0	ug/L	1/13/99	502.2
2,2-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
cis-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Chloroform	< 0.5	ug/L	1/13/99	502.2
Bromochloromethane	< 1.0	ug/L	1/13/99	502.2
1,1,1-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloropropene	< 1.0	ug/L	1/13/99	502.2
Carbon Tetrachloride	< 0.5	ug/L	1/13/99	502.2
Benzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dichloroethane	< 0.5	ug/L	1/13/99	502.2
Trichloroethene	< 0.5	ug/L	1/13/99	502.2
1,2-Dichloropropane	< 0.5	ug/L	1/13/99	502.2
Bromodichloromethane	< 0.5	ug/L	1/13/99	502.2
Dibromomethane	< 1.0	ug/L	1/13/99	502.2
cis-1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Toluene	< 0.6	ug/L	1/13/99	502.2
trans-1,3-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
1,1,2-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
Tetrachloroethene	< 0.5	ug/L	1/13/99	502.2
1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Dibromochloromethane	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromoethane	< 2.0	ug/L	1/13/99	502.2
Chlorobenzene	< 0.5	ug/L	1/13/99	502.2
Ethylbenzene	< 0.5	ug/L	1/13/99	502.2
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
Total Xylenes	< 0.5	ug/L	1/13/99	502.2
Styrene	< 0.5	ug/L	1/13/99	502.2
Isopropylbenzene	< 2.0	ug/L	1/13/99	502.2
Bromoform	< 0.5	ug/L	1/13/99	502.2
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
1,2,3-Trichloropropane	< 1.0	ug/l	1/13/99	502.2
n-Propylbenzene	< 10.0	ug/L	1/13/99	502.2

Analysis Performed	Results		Analyzed	Method
Bromobenzene	< 1.0	ug/L	1/13/99	502.2
2-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
4-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
1,3,5-Trimethylbenzene	< 2.0	ug/L	1/13/99	502.2
tert-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2,4-Trimethylbenzene	< 1.0	ug/L	1/13/99	502.2
sec-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
p-isopropyltoluene	< 2.0	ug/L	1/13/99	502.2
1,3-Dichlorobenzene	< 1.0	ug/L	1/13/99	502.2
1,4-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
n-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromo-3-Chloroprop	< 5.0	ug/L	1/13/99	502.2
1,2,4-Trichlorobenzene	< 0.5	ug/L	1/13/99	502.2
Hexachlorobutadiene	< 1.0	ug/L	1/13/99	502.2
Naphthalene	< 20.0	ug/L	1/13/99	502.2
1,2,3-Trichlorobenzene	< 2.0	ug/L	1/13/99	502.2

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

Douglas H. Edwards Jr

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991461
Lab Number: 99-D20

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 6/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF MW-4, LOCATED AT MAIN ENTRANCE TO MODINE MFG PROPERTY COLLECTED VIA SUBMERSIBLE PUMP
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Turbidity	86.6	NTU	1/ 6/99	180.1
Comment: Analyzed in field				
Specific Conductivity	687	umhos/cm	1/ 6/99	120.1
Comment: Analyzed in field				
pH	7.22		1/ 6/99	150.1
Comment: Analyzed in field				
Temperature - C	15	Degrees C	1/ 6/99	
Comment: Analyzed in field				
Silver, Dissolved	< 5.00	ug/L	1/13/99	200.7
Arsenic, Dissolved	< 1.2	ug/L	1/14/99	206.2
Barium, Dissolved	81.6	ug/L	1/13/99	200.7
Cadmium, Dissolved	< 1.00	ug/L	1/13/99	200.7
Chromium, Dissolved	< 2.00	ug/L	1/13/99	200.7
Copper, Dissolved	< 3.00	ug/L	1/13/99	200.7
Mercury, Dissolved	< 0.20	ug/L	1/29/99	245.1
Nickel, Dissolved	5.81	ug/L	1/13/99	200.7
Lead, Dissolved	< 2.5	ug/L	1/14/99	239.2
Selenium, Dissolved	< 1.0	ug/L	1/14/99	270.2
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	88.3	ug/L	1/13/99	200.7
Cadmium, Total	< 1.00	ug/L	1/13/99	200.7
Chromium, Total	5.52	ug/L	1/13/99	200.7

Recycled Paper

Analysis Performed	Results		Analyzed	Method
Copper, Total	< 5.00	ug/L	1/13/99	200.7
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	7.61	ug/L	1/13/99	200.7
Lead, Total	38.7	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOC Results:				
Dichlorodifluoromethane	< 200	ug/L	1/13/99	502.2
Chloromethane	< 2.5	ug/L	1/13/99	502.2
Vinyl Chloride	< 0.5	ug/L	1/13/99	502.2
Bromomethane	< 9.0	ug/L	1/13/99	502.2
Chloroethane	< 2.5	ug/L	1/13/99	502.2
Trichlorofluoromethane	< 2.5	ug/L	1/13/99	502.2
1,1-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Methylene Chloride	< 0.5	ug/L	1/13/99	502.2
Methyl-tert-butyl ether	< 2.0	ug/L	1/13/99	502.2
trans-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloroethane	< 1.0	ug/L	1/13/99	502.2
2,2-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
cis-1,2-Dichloroethene	2.1	ug/L	1/13/99	502.2
Chloroform	< 0.5	ug/L	1/13/99	502.2
Bromochloromethane	< 1.0	ug/L	1/13/99	502.2
1,1,1-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloropropene	< 1.0	ug/L	1/13/99	502.2
Carbon Tetrachloride	< 0.5	ug/L	1/13/99	502.2
Benzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dichloroethane	< 0.5	ug/L	1/13/99	502.2
Trichloroethene	64.1	ug/L	1/13/99	502.2
1,2-Dichloropropane	< 0.5	ug/L	1/13/99	502.2
Bromodichloromethane	< 0.5	ug/L	1/13/99	502.2
Dibromomethane	< 1.0	ug/L	1/13/99	502.2
cis-1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Toluene	< 0.6	ug/L	1/13/99	502.2
trans-1,3-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
1,1,2-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
Tetrachloroethene	< 0.5	ug/L	1/13/99	502.2
1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Dibromochloromethane	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromoethane	< 2.0	ug/L	1/13/99	502.2
Chlorobenzene	< 0.5	ug/L	1/13/99	502.2
Ethylbenzene	< 0.5	ug/L	1/13/99	502.2
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
Total Xylenes	< 0.5	ug/L	1/13/99	502.2
Styrene	< 0.5	ug/L	1/13/99	502.2
Isopropylbenzene	< 2.0	ug/L	1/13/99	502.2
Bromoform	< 0.5	ug/L	1/13/99	502.2
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
1,2,3-Trichloropropane	< 1.0	ug/l	1/13/99	502.2
n-Propylbenzene	< 2.0	ug/L	1/13/99	502.2

Analysis Performed	Results		Analyzed	Method
Bromobenzene	< 1.0	ug/L	1/13/99	502.2
2-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
4-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
1,3,5-Trimethylbenzene	< 2.0	ug/L	1/13/99	502.2
tert-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2,4-Trimethylbenzene	< 1.0	ug/L	1/13/99	502.2
sec-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
p-isopropyltoluene	< 2.0	ug/L	1/13/99	502.2
1,3-Dichlorobenzene	< 1.0	ug/L	1/13/99	502.2
1,4-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
n-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromo-3-Chloroprop	< 5.0	ug/L	1/13/99	502.2
1,2,4-Trichlorobenzene	< 0.5	ug/L	1/13/99	502.2
Hexachlorobutadiene	< 1.0	ug/L	1/13/99	502.2
Naphthalene	< 20.0	ug/L	1/13/99	502.2
1,2,3-Trichlorobenzene	< 2.0	ug/L	1/13/99	502.2

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

Douglas N. Edwards for

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

STATE OF MISSOURI
Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991462
Lab Number: 99-D21

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 1/26/99
Date Collected: 1/ 6/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF MW-4, LOCATED AT MAIN ENTRANCE TO MODINE MFG PROPERTY COLLECTED VIA BAILER
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
VOC Results:				
Dichlorodifluoromethane	< 200	ug/L	1/13/99	502.2
Chloromethane	< 2.5	ug/L	1/13/99	502.2
Vinyl Chloride	< 0.5	ug/L	1/13/99	502.2
Bromomethane	< 9.0	ug/L	1/13/99	502.2
Chloroethane	< 2.5	ug/L	1/13/99	502.2
Trichlorofluoromethane	< 2.5	ug/L	1/13/99	502.2
1,1-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Methylene Chloride	< 0.5	ug/L	1/13/99	502.2
Methyl-tert-butyl ether	< 2.0	ug/L	1/13/99	502.2
trans-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloroethane	< 1.0	ug/L	1/13/99	502.2
2,2-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
cis-1,2-Dichloroethene	2.3	ug/L	1/13/99	502.2
Chloroform	< 0.5	ug/L	1/13/99	502.2
Bromochloromethane	< 1.0	ug/L	1/13/99	502.2
1,1,1-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloropropene	< 1.0	ug/L	1/13/99	502.2
Carbon Tetrachloride	< 0.5	ug/L	1/13/99	502.2
Benzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dichloroethane	< 0.5	ug/L	1/13/99	502.2
Trichloroethene	76.5	ug/L	1/13/99	502.2
1,2-Dichloropropane	< 0.5	ug/L	1/13/99	502.2

Recycled Paper

Analysis Performed	Results		Analyzed	Method
Bromodichloromethane	< 0.5	ug/L	1/13/99	502.2
Dibromomethane	< 1.0	ug/L	1/13/99	502.2
cis-1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Toluene	< 0.6	ug/L	1/13/99	502.2
trans-1,3-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
1,1,2-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
Tetrachloroethene	< 0.5	ug/L	1/13/99	502.2
1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Dibromochloromethane	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromoethane	< 2.0	ug/L	1/13/99	502.2
Chlorobenzene	< 0.5	ug/L	1/13/99	502.2
Ethylbenzene	< 0.5	ug/L	1/13/99	502.2
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
Total Xylenes	< 0.5	ug/L	1/13/99	502.2
Styrene	< 0.5	ug/L	1/13/99	502.2
Isopropylbenzene	< 2.0	ug/L	1/13/99	502.2
Bromoform	< 0.5	ug/L	1/13/99	502.2
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
1,2,3-Trichloropropane	< 1.0	ug/l	1/13/99	502.2
n-Propylbenzene	< 2.0	ug/L	1/13/99	502.2
Bromobenzene	< 1.0	ug/L	1/13/99	502.2
2-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
4-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
1,3,5-Trimethylbenzene	< 2.0	ug/L	1/13/99	502.2
tert-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2,4-Trimethylbenzene	< 1.0	ug/L	1/13/99	502.2
sec-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
p-isopropyltoluene	< 2.0	ug/L	1/13/99	502.2
1,3-Dichlorobenzene	< 1.0	ug/L	1/13/99	502.2
1,4-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
n-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromo-3-Chloroprop	< 5.0	ug/L	1/13/99	502.2
1,2,4-Trichlorobenzene	< 0.5	ug/L	1/13/99	502.2
Hexachlorobutadiene	< 1.0	ug/L	1/13/99	502.2
Naphthalene	< 20.0	ug/L	1/13/99	502.2
1,2,3-Trichlorobenzene	< 2.0	ug/L	1/13/99	502.2

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director
STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991463
Lab Number: 99-D22

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 7/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF MW-2, LOCATED ON NORTHEAST SIDE OF MODINE MFG BUILDING
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Turbidity	372	NTU	1/ 7/99	180.1
Comment: Analyzed in field				
Specific Conductivity	796	umhos/cm	1/ 7/99	120.1
Comment: Analyzed in field				
pH	7.16		1/ 7/99	150.1
Comment: Analyzed in field				
Temperature - C	13	Degrees C	1/ 7/99	
Comment: Analyzed in field				
Silver, Dissolved	< 5.00	ug/L	1/13/99	200.7
Arsenic, Dissolved	< 1.2	ug/L	1/14/99	206.2
Barium, Dissolved	91.0	ug/L	1/13/99	200.7
Cadmium, Dissolved	< 1.00	ug/L	1/13/99	200.7
Chromium, Dissolved	< 2.00	ug/L	1/13/99	200.7
Copper, Dissolved	< 3.00	ug/L	1/13/99	200.7
Mercury, Dissolved	< 0.20	ug/L	1/29/99	245.1
Nickel, Dissolved	< 3.00	ug/L	1/13/99	200.7
Lead, Dissolved	< 2.5	ug/L	1/14/99	239.2
Selenium, Dissolved	< 1.0	ug/L	1/14/99	270.2
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	112	ug/L	1/13/99	200.7
Cadmium, Total	< 1.00	ug/L	1/13/99	200.7
Chromium, Total	14.3	ug/L	1/13/99	200.7
Copper, Total	7.85	ug/L	1/13/99	200.7

Recycled Paper

Analysis Performed	Results		Analyzed	Method
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	8.45	ug/L	1/13/99	200.7
Lead, Total	37.2	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOC Results:				
Dichlorodifluoromethane	< 200	ug/L	1/13/99	502.2
Chloromethane	< 2.5	ug/L	1/13/99	502.2
Vinyl Chloride	< 0.5	ug/L	1/13/99	502.2
Bromomethane	< 9.0	ug/L	1/13/99	502.2
Chloroethane	< 2.5	ug/L	1/13/99	502.2
Trichlorofluoromethane	< 2.5	ug/L	1/13/99	502.2
1,1-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Methylene Chloride	< 0.5	ug/L	1/13/99	502.2
Methyl-tert-butyl ether	< 2.0	ug/L	1/13/99	502.2
trans-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloroethane	< 1.0	ug/L	1/13/99	502.2
2,2-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
cis-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Chloroform	< 0.5	ug/L	1/13/99	502.2
Bromochloromethane	< 1.0	ug/L	1/13/99	502.2
1,1,1-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloropropene	< 1.0	ug/L	1/13/99	502.2
Carbon Tetrachloride	< 0.5	ug/L	1/13/99	502.2
Benzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dichloroethane	< 0.5	ug/L	1/13/99	502.2
Trichloroethene	2.5	ug/L	1/13/99	502.2
1,2-Dichloropropane	< 0.5	ug/L	1/13/99	502.2
Bromodichloromethane	< 0.5	ug/L	1/13/99	502.2
Dibromomethane	< 1.0	ug/L	1/13/99	502.2
cis-1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Toluene	< 0.6	ug/L	1/13/99	502.2
trans-1,3-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
1,1,2-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
Tetrachloroethene	< 0.5	ug/L	1/13/99	502.2
1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Dibromochloromethane	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromoethane	< 2.0	ug/L	1/13/99	502.2
Chlorobenzene	< 0.5	ug/L	1/13/99	502.2
Ethylbenzene	< 0.5	ug/L	1/13/99	502.2
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
Total Xylenes	< 0.5	ug/L	1/13/99	502.2
Styrene	< 0.5	ug/L	1/13/99	502.2
Isopropylbenzene	< 2.0	ug/L	1/13/99	502.2
Bromoform	< 0.5	ug/L	1/13/99	502.2
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
1,2,3-Trichloropropane	< 1.0	ug/l	1/13/99	502.2
n-Propylbenzene	< 10.0	ug/L	1/13/99	502.2
Bromobenzene	< 1.0	ug/L	1/13/99	502.2

Analysis Performed	Results		Analyzed	Method
2-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
4-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
1,3,5-Trimethylbenzene	< 2.0	ug/L	1/13/99	502.2
tert-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2,4-Trimethylbenzene	< 1.0	ug/L	1/13/99	502.2
sec-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
p-isopropyltoluene	< 2.0	ug/L	1/13/99	502.2
1,3-Dichlorobenzene	< 1.0	ug/L	1/13/99	502.2
1,4-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
n-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromo-3-Chloroprop	< 5.0	ug/L	1/13/99	502.2
1,2,4-Trichlorobenzene	< 0.5	ug/L	1/13/99	502.2
Hexachlorobutadiene	< 1.0	ug/L	1/13/99	502.2
Naphthalene	< 20.0	ug/L	1/13/99	502.2
1,2,3-Trichlorobenzene	< 2.0	ug/L	1/13/99	502.2

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

Douglas H. Edwards

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991464
Lab Number: 99-D23

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 7/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF MW-1, LOCATED IN WESTERN GRAVEL PARKING LOT ON MODINE MANUFACTURING PROPERTY
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Turbidity	143	NTU	1/ 7/99	180.1
Comment: Analyzed in field				
Specific Conductivity	532	umhos/cm	1/ 7/99	120.1
Comment: Analyzed in field				
pH	7.62		1/ 7/99	150.1
Comment: Analyzed in field				
Temperature - C	13	Degrees C	1/ 7/99	
Comment: Analyzed in field				
Silver, Dissolved	< 5.00	ug/L	1/13/99	200.7
Arsenic, Dissolved	< 1.2	ug/L	1/14/99	206.2
Barium, Dissolved	49.7	ug/L	1/13/99	200.7
Cadmium, Dissolved	< 1.00	ug/L	1/13/99	200.7
Chromium, Dissolved	< 2.00	ug/L	1/13/99	200.7
Copper, Dissolved	< 3.00	ug/L	1/13/99	200.7
Mercury, Dissolved	< 0.20	ug/L	1/29/99	245.1
Nickel, Dissolved	< 3.00	ug/L	1/13/99	200.7
Lead, Dissolved	< 2.5	ug/L	1/14/99	239.2
Selenium, Dissolved	< 1.0	ug/L	1/14/99	270.2
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	58.2	ug/L	1/13/99	200.7
Cadmium, Total	< 1.00	ug/L	1/13/99	200.7
Chromium, Total	3.84	ug/L	1/13/99	200.7

Recycled Paper

Analysis Performed	Results		Analyzed	Method
Copper, Total	6.94	ug/L	1/13/99	200.7
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	< 3.00	ug/L	1/13/99	200.7
Lead, Total	14.1	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOC Results:				
Dichlorodifluoromethane	< 200	ug/L	1/13/99	502.2
Chloromethane	< 2.5	ug/L	1/13/99	502.2
Vinyl Chloride	< 0.5	ug/L	1/13/99	502.2
Bromomethane	< 9.0	ug/L	1/13/99	502.2
Chloroethane	< 2.5	ug/L	1/13/99	502.2
Trichlorofluoromethane	< 2.5	ug/L	1/13/99	502.2
1,1-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Methylene Chloride	< 0.5	ug/L	1/13/99	502.2
Methyl-tert-butyl ether	< 2.0	ug/L	1/13/99	502.2
trans-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloroethane	< 1.0	ug/L	1/13/99	502.2
2,2-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
cis-1,2-Dichloroethene	< 0.5	ug/L	1/13/99	502.2
Chloroform	< 0.5	ug/L	1/13/99	502.2
Bromochloromethane	< 1.0	ug/L	1/13/99	502.2
1,1,1-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
1,1-Dichloropropene	< 1.0	ug/L	1/13/99	502.2
Carbon Tetrachloride	< 0.5	ug/L	1/13/99	502.2
Benzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dichloroethane	< 0.5	ug/L	1/13/99	502.2
Trichloroethene	10.1	ug/L	1/13/99	502.2
1,2-Dichloropropane	< 0.5	ug/L	1/13/99	502.2
Bromodichloromethane	< 0.5	ug/L	1/13/99	502.2
Dibromomethane	< 1.0	ug/L	1/13/99	502.2
cis-1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Toluene	< 0.6	ug/L	1/13/99	502.2
trans-1,3-Dichloropropane	< 1.0	ug/L	1/13/99	502.2
1,1,2-Trichloroethane	< 0.5	ug/L	1/13/99	502.2
Tetrachloroethene	< 0.5	ug/L	1/13/99	502.2
1,3-Dichloropropane	< 2.0	ug/L	1/13/99	502.2
Dibromochloromethane	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromoethane	< 2.0	ug/L	1/13/99	502.2
Chlorobenzene	< 0.5	ug/L	1/13/99	502.2
Ethylbenzene	< 0.5	ug/L	1/13/99	502.2
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
Total Xylenes	< 0.5	ug/L	1/13/99	502.2
Styrene	< 0.5	ug/L	1/13/99	502.2
Isopropylbenzene	< 2.0	ug/L	1/13/99	502.2
Bromoform	< 0.5	ug/L	1/13/99	502.2
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1/13/99	502.2
1,2,3-Trichloropropane	< 1.0	ug/l	1/13/99	502.2
n-Propylbenzene	< 2.0	ug/L	1/13/99	502.2

Analysis Performed	Results		Analyzed	Method
Bromobenzene	< 1.0	ug/L	1/13/99	502.2
2-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
4-Chlorotoluene	< 2.0	ug/L	1/13/99	502.2
1,3,5-Trimethylbenzene	< 2.0	ug/L	1/13/99	502.2
tert-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2,4-Trimethylbenzene	< 1.0	ug/L	1/13/99	502.2
sec-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
p-isopropyltoluene	< 2.0	ug/L	1/13/99	502.2
1,3-Dichlorobenzene	< 1.0	ug/L	1/13/99	502.2
1,4-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
n-Butylbenzene	< 2.0	ug/L	1/13/99	502.2
1,2-Dichlorobenzene	< 0.5	ug/L	1/13/99	502.2
1,2-Dibromo-3-Chloroprop	< 5.0	ug/L	1/13/99	502.2
1,2,4-Trichlorobenzene	< 0.5	ug/L	1/13/99	502.2
Hexachlorobutadiene	< 1.0	ug/L	1/13/99	502.2
Naphthalene	< 20.0	ug/L	1/13/99	502.2
1,2,3-Trichlorobenzene	< 2.0	ug/L	1/13/99	502.2

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

Douglas N. Edwards for

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991465
Lab Number: 99-D24

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 7/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF MW-5, LOCATED ADJACENT (SOUTHWEST) TO FORMER HULETT LAGOON
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Turbidity	456	NTU	1/ 7/99	180.1
Comment: Analyzed in field				
Specific Conductivity	709	umhos/cm	1/ 7/99	120.1
Comment: Analyzed in field				
pH	7.50		1/ 7/99	150.1
Comment: Analyzed in field				
Temperature - C	12	Degrees C	1/ 7/99	
Comment: Analyzed in field				
Silver, Dissolved	< 5.00	ug/L	1/13/99	200.7
Arsenic, Dissolved	< 1.2	ug/L	1/14/99	206.2
Barium, Dissolved	55.7	ug/L	1/13/99	200.7
Cadmium, Dissolved	< 1.00	ug/L	1/13/99	200.7
Chromium, Dissolved	< 2.00	ug/L	1/13/99	200.7
Copper, Dissolved	< 3.00	ug/L	1/13/99	200.7
Mercury, Dissolved	< 0.20	ug/L	1/29/99	245.1
Nickel, Dissolved	< 3.00	ug/L	1/13/99	200.7
Lead, Dissolved	< 2.5	ug/L	1/14/99	239.2
Selenium, Dissolved	< 1.0	ug/L	1/14/99	270.2
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	67.9	ug/L	1/13/99	200.7
Cadmium, Total	1.25	ug/L	1/13/99	200.7
Chromium, Total	9.39	ug/L	1/13/99	200.7
Copper, Total	7.52	ug/L	1/13/99	200.7

Recycled Paper

Lab Number: 99-D24
Sample Number: 991465
February 10, 1999

Analysis Performed	Results		Analyzed	Method
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	5.16	ug/L	1/13/99	200.7
Lead, Total	12.7	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOA Results:				
Chloromethane	< 5.0	ug/L	1/ 8/99	8260
Vinyl Chloride	< 5.0	ug/L	1/ 8/99	8260
Bromomethane	< 5.0	ug/L	1/ 8/99	8260
Chloroethane	< 5.0	ug/L	1/ 8/99	8260
1,1-Dichloroethene	< 5.0	ug/L	1/ 8/99	8260
Acetone	< 20.0	ug/L	1/ 8/99	8260
Carbon Disulfide	< 5.0	ug/L	1/ 8/99	8260
Methylene Chloride	< 20.0	ug/L	1/ 8/99	8260
Methyl Tert-Butyl Ether	< 5.0	ug/L	1/ 8/99	8260
trans-1,2-Dichloroethene	< 5.0	ug/L	1/ 8/99	8260
1,1-Dichloroethane	< 5.0	ug/L	1/ 8/99	8260
2-Butanone	< 20.0	ug/L	1/ 8/99	8260
cis-1,2-Dichloroethene	35.0	ug/L	1/ 8/99	8260
Chloroform	< 5.0	ug/L	1/ 8/99	8260
1,1,1-Trichloroethane	< 5.0	ug/L	1/ 8/99	8260
Carbon Tetrachloride	< 5.0	ug/L	1/ 8/99	8260
Benzene	< 5.0	ug/L	1/ 8/99	8260
1,2-Dichloroethane	< 5.0	ug/L	1/ 8/99	8260
Trichloroethene	1,400	ug/L	1/ 8/99	8260
1,2-Dichloropropane	< 5.0	ug/L	1/ 8/99	8260
Bromodichloromethane	< 5.0	ug/L	1/ 8/99	8260
2-Hexanone	< 20.0	ug/L	1/ 8/99	8260
Trans-1,3-Dichloropropene	< 5.0	ug/L	1/ 8/99	8260
Toluene	< 5.0	ug/L	1/ 8/99	8260
CIS-1,3-Dichloropropene	< 5.0	ug/L	1/ 8/99	8260
1,1,2-Trichloroethane	< 5.0	ug/L	1/ 8/99	8260
4-Methyl-2-Pentanone	< 20.0	ug/L	1/ 8/99	8260
Tetrachloroethene	< 5.0	ug/L	1/ 8/99	8260
Dibromochloromethane	< 5.0	ug/L	1/ 8/99	8260
Chlorobenzene	< 5.0	ug/L	1/ 8/99	8260
Ethylbenzene	< 5.0	ug/L	1/ 8/99	8260
Total Xylenes	< 5.0	ug/L	1/ 8/99	8260
Styrene	< 5.0	ug/L	1/ 8/99	8260
Bromoform	< 5.0	ug/L	1/ 8/99	8260
1,1,2,2-Tetrachloroethane	< 5.0	ug/L	1/ 8/99	8260
1,3-Dichlorobenzene	< 5.0	ug/L	1/ 8/99	8260
1,4-Dichlorobenzene	< 5.0	ug/L	1/ 8/99	8260
1,2-Dichlorobenzene	< 5.0	ug/L	1/ 8/99	8260

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

Douglas N. Edwards for

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991466
Lab Number: 99-D25

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/10/99
Date Collected: 1/ 7/99
Date Received: 1/ 7/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE, WATER
Sample Description: GRAB OF MW-5, LOCATED ADJACENT (SOUTHWEST) TO FORMER HULETT LAGOON (DUPLICATE)
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Turbidity	456	NTU	1/ 7/99	180.1
Comment: Analyzed in field				
Specific Conductivity	709	umhos/cm	1/ 7/99	120.1
Comment: Analyzed in field				
pH	7.50		1/ 7/99	150.1
Comment: Analyzed in field				
Temperature - C	12	Degrees C	1/ 7/99	
Comment: Analyzed in field				
Silver, Dissolved	< 5.00	ug/L	1/13/99	200.7
Arsenic, Dissolved	< 1.2	ug/L	1/14/99	206.2
Barium, Dissolved	51.6	ug/L	1/13/99	200.7
Cadmium, Dissolved	< 1.00	ug/L	1/13/99	200.7
Chromium, Dissolved	< 2.00	ug/L	1/13/99	200.7
Copper, Dissolved	< 3.00	ug/L	1/13/99	200.7
Mercury, Dissolved	< 0.20	ug/L	1/29/99	245.1
Nickel, Dissolved	< 3.00	ug/L	1/13/99	200.7
Lead, Dissolved	< 2.5	ug/L	1/14/99	239.2
Selenium, Dissolved	< 1.0	ug/L	1/14/99	270.2
Silver, Total	< 5.00	ug/L	1/13/99	200.7
Arsenic, Total	< 1.2	ug/L	1/14/99	206.2
Barium, Total	71.3	ug/L	1/13/99	200.7
Cadmium, Total	1.97	ug/L	1/13/99	200.7
Chromium, Total	13.3	ug/L	1/13/99	200.7

Recycled Paper

Analysis Performed	Results		Analyzed	Method
Copper, Total	8.97	ug/L	1/13/99	200.7
Mercury, Total	< 0.20	ug/L	1/29/99	245.1
Nickel, Total	4.26	ug/L	1/13/99	200.7
Lead, Total	15.3	ug/L	1/14/99	239.2
Selenium, Total	< 1.0	ug/L	1/14/99	270.2
VOA Results:				
Chloromethane	< 5.0	ug/L	1/ 8/99	8260
Vinyl Chloride	< 5.0	ug/L	1/ 8/99	8260
Bromomethane	< 5.0	ug/L	1/ 8/99	8260
Chloroethane	< 5.0	ug/L	1/ 8/99	8260
1,1-Dichloroethene	< 5.0	ug/L	1/ 8/99	8260
Acetone	< 20.0	ug/L	1/ 8/99	8260
Carbon Disulfide	< 5.0	ug/L	1/ 8/99	8260
Methylene Chloride	< 20.0	ug/L	1/ 8/99	8260
Methyl Tert-Butyl Ether	< 5.0	ug/L	1/ 8/99	8260
trans-1,2-Dichloroethene	< 5.0	ug/L	1/ 8/99	8260
1,1-Dichloroethane	< 5.0	ug/L	1/ 8/99	8260
2-Butanone	< 20.0	ug/L	1/ 8/99	8260
cis-1,2-Dichloroethene	23.0	ug/L	1/ 8/99	8260
Chloroform	< 5.0	ug/L	1/ 8/99	8260
1,1,1-Trichloroethane	< 5.0	ug/L	1/ 8/99	8260
Carbon Tetrachloride	< 5.0	ug/L	1/ 8/99	8260
Benzene	< 5.0	ug/L	1/ 8/99	8260
1,2-Dichloroethane	< 5.0	ug/L	1/ 8/99	8260
Trichloroethene	1,500	ug/L	1/ 8/99	8260
1,2-Dichloropropane	< 5.0	ug/L	1/ 8/99	8260
Bromodichloromethane	< 5.0	ug/L	1/ 8/99	8260
2-Hexanone	< 20.0	ug/L	1/ 8/99	8260
Trans-1,3-Dichloropropene	< 5.0	ug/L	1/ 8/99	8260
Toluene	< 5.0	ug/L	1/ 8/99	8260
CIS-1,3-Dichloropropene	< 5.0	ug/L	1/ 8/99	8260
1,1,2-Trichloroethane	< 5.0	ug/L	1/ 8/99	8260
4-Methyl-2-Pentanone	< 20.0	ug/L	1/ 8/99	8260
Tetrachloroethene	< 5.0	ug/L	1/ 8/99	8260
Dibromochloromethane	< 5.0	ug/L	1/ 8/99	8260
Chlorobenzene	< 5.0	ug/L	1/ 8/99	8260
Ethylbenzene	< 5.0	ug/L	1/ 8/99	8260
Total Xylenes	< 5.0	ug/L	1/ 8/99	8260
Styrene	< 5.0	ug/L	1/ 8/99	8260
Bromoform	< 5.0	ug/L	1/ 8/99	8260
1,1,2,2-Tetrachloroethane	< 5.0	ug/L	1/ 8/99	8260
1,3-Dichlorobenzene	< 5.0	ug/L	1/ 8/99	8260
1,4-Dichlorobenzene	< 5.0	ug/L	1/ 8/99	8260
1,2-Dichlorobenzene	< 5.0	ug/L	1/ 8/99	8260

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991467
Lab Number: 99-D136

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/24/99
Date Collected: 1/21/99
Date Received: 1/22/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: SOIL GRAB OF BORING "HULETT-03" COLLECTED FROM 3-4 FT DEPTH
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 1,000	ug/kg	2/ 3/99	200.7
Arsenic, Total	13,600	ug/kg	2/ 4/99	206.2
Barium, Total	244,000	ug/kg	2/ 3/99	200.7
Cadmium, Total	304	ug/kg	2/ 3/99	200.7
Chromium, Total	55,500	ug/kg	2/ 3/99	200.7
Copper, Total	33,600	ug/kg	2/ 3/99	200.7
Mercury, Total	107	ug/kg	1/29/99	245.1
Nickel, Total	49,400	ug/kg	2/ 3/99	200.7
Lead, Total	118,000	ug/kg	2/ 3/99	239.2
Selenium, Total	< 1,000	ug/kg	2/ 4/99	270.2
Lead, TCLP	77.2	ug/L	2/19/99	239.2
VOA Results:				
Chloromethane	< 25.0	ug/kg	1/25/99	8260
Vinyl Chloride	< 25.0	ug/kg	1/25/99	8260
Bromomethane	< 25.0	ug/kg	1/25/99	8260
Chloroethane	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
Acetone	< 100	ug/kg	1/25/99	8260
Carbon Disulfide	< 25.0	ug/kg	1/25/99	8260
Methylene Chloride	< 100	ug/kg	1/25/99	8260
Methyl Tertiary Butyl Eth	< 25.0	ug/kg	1/25/99	8260
trans-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
2-Butanone	< 100	ug/kg	1/25/99	8260

Recycled Paper

Analysis Performed	Results		Analyzed	Method
cis-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
Chloroform	< 25.0	ug/kg	1/25/99	8260
1,1,1-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
Carbon Tetrachloride	< 25.0	ug/kg	1/25/99	8260
Benzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
Trichloroethene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloropropane	< 25.0	ug/kg	1/25/99	8260
Bromodichloromethane	< 25.0	ug/kg	1/25/99	8260
2-Hexanone	< 100	ug/kg	1/25/99	8260
Trans-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
Toluene	< 25.0	ug/kg	1/25/99	8260
CIS-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
1,1,2-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
4-Methyl-2-Pentanone	< 100	ug/kg	1/25/99	8260
Tetrachloroethene	< 25.0	ug/kg	1/25/99	8260
Dibromochloromethane	< 25.0	ug/kg	1/25/99	8260
Chlorobenzene	< 25.0	ug/kg	1/25/99	8260
Ethylbenzene	< 25.0	ug/kg	1/25/99	8260
Total Xylenes	< 25.0	ug/kg	1/25/99	8260
Styrene	< 25.0	ug/kg	1/25/99	8260
Bromoform	< 25.0	ug/kg	1/25/99	8260
1,1,2,2-Tetrachloroethane	< 25.0	ug/kg	1/25/99	8260
1,3-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,4-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260

Metals results are reported on a dry weight basis

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991468
Lab Number: 99-D137

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/24/99
Date Collected: 1/21/99
Date Received: 1/22/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: SOIL GRAB OF BORING "HULETT-03" COLLECTED FROM 4.5-5.5 FT DEPTH
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 1,000	ug/kg	2/ 3/99	200.7
Arsenic, Total	12,500	ug/kg	2/ 4/99	206.2
Barium, Total	519,000	ug/kg	2/ 3/99	200.7
Cadmium, Total	386	ug/kg	2/ 3/99	200.7
Chromium, Total	61,300	ug/kg	2/ 3/99	200.7
Copper, Total	37,500	ug/kg	2/ 3/99	200.7
Mercury, Total	139	ug/kg	1/29/99	245.1
Nickel, Total	69,600	ug/kg	2/ 3/99	200.7
Lead, Total	951,000	ug/kg	2/ 3/99	239.2
Selenium, Total	< 1,000	ug/kg	2/ 4/99	270.2
Barium, TCLP	442	ug/L	2/19/99	200.7
Lead, TCLP	143	ug/L	2/19/99	239.2
VOA Results:				
Chloromethane	< 25.0	ug/kg	1/25/99	8260
Vinyl Chloride	< 25.0	ug/kg	1/25/99	8260
Bromomethane	< 25.0	ug/kg	1/25/99	8260
Chloroethane	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
Acetone	< 100	ug/kg	1/25/99	8260
Carbon Disulfide	< 25.0	ug/kg	1/25/99	8260
Methylene Chloride	< 100	ug/kg	1/25/99	8260
Methyl Tertiary Butyl Eth	< 25.0	ug/kg	1/25/99	8260
trans-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethane	< 25.0	ug/kg	1/25/99	8260

Recycled Paper

Analysis Performed	Results		Analyzed	Method
2-Butanone	< 100	ug/kg	1/25/99	8260
cis-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
Chloroform	< 25.0	ug/kg	1/25/99	8260
1,1,1-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
Carbon Tetrachloride	< 25.0	ug/kg	1/25/99	8260
Benzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
Trichloroethene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloropropane	< 25.0	ug/kg	1/25/99	8260
Bromodichloromethane	< 25.0	ug/kg	1/25/99	8260
2-Hexanone	< 100	ug/kg	1/25/99	8260
Trans-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
Toluene	< 25.0	ug/kg	1/25/99	8260
CIS-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
1,1,2-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
4-Methyl-2-Pentanone	< 100	ug/kg	1/25/99	8260
Tetrachloroethene	< 25.0	ug/kg	1/25/99	8260
Dibromochloromethane	< 25.0	ug/kg	1/25/99	8260
Chlorobenzene	< 25.0	ug/kg	1/25/99	8260
Ethylbenzene	< 25.0	ug/kg	1/25/99	8260
Total Xylenes	< 25.0	ug/kg	1/25/99	8260
Styrene	< 25.0	ug/kg	1/25/99	8260
Bromoform	< 25.0	ug/kg	1/25/99	8260
1,1,2,2-Tetrachloroethane	< 25.0	ug/kg	1/25/99	8260
1,3-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,4-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260

Metals results are reported on a dry weight basis

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M Mahfood, Director
STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991469
Lab Number: 99-D138

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/24/99
Date Collected: 1/21/99
Date Received: 1/22/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: SOIL GRAB OF BORING "HULETT-01" COLLECTED FROM 4.5-5 FT DEPTH
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 1,000	ug/kg	2/ 3/99	200.7
Arsenic, Total	16,100	ug/kg	2/ 4/99	206.2
Barium, Total	150,000	ug/kg	2/ 3/99	200.7
Cadmium, Total	453	ug/kg	2/ 3/99	200.7
Chromium, Total	74,900	ug/kg	2/ 3/99	200.7
Copper, Total	39,900	ug/kg	2/ 3/99	200.7
Mercury, Total	102	ug/kg	1/29/99	245.1
Nickel, Total	43,300	ug/kg	2/ 3/99	200.7
Lead, Total	116,000	ug/kg	2/ 3/99	239.2
Selenium, Total	< 1,000	ug/kg	2/ 4/99	270.2
Lead, TCLP	< 25.0	ug/L	2/19/99	239.2
VOA Results:				
Chloromethane	< 25.0	ug/kg	1/25/99	8260
Vinyl Chloride	< 25.0	ug/kg	1/25/99	8260
Bromomethane	< 25.0	ug/kg	1/25/99	8260
Chloroethane	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
Acetone	< 100	ug/kg	1/25/99	8260
Carbon Disulfide	< 25.0	ug/kg	1/25/99	8260
Methylene Chloride	< 100	ug/kg	1/25/99	8260
Methyl Tertiary Butyl Eth	< 25.0	ug/kg	1/25/99	8260
trans-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
2-Butanone	< 100	ug/kg	1/25/99	8260

Recycled Paper

Analysis Performed	Results		Analyzed	Method
cis-1,2-Dichloroethene	190	ug/kg	1/25/99	8260
Chloroform	< 25.0	ug/kg	1/25/99	8260
1,1,1-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
Carbon Tetrachloride	< 25.0	ug/kg	1/25/99	8260
Benzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
Trichloroethene	9,500	ug/kg	1/25/99	8260
Comment: Dilution analyzed 1/26/99				
1,2-Dichloropropane	< 25.0	ug/kg	1/25/99	8260
Bromodichloromethane	< 25.0	ug/kg	1/25/99	8260
2-Hexanone	< 100	ug/kg	1/25/99	8260
Trans-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
Toluene	< 25.0	ug/kg	1/25/99	8260
CIS-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
1,1,2-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
4-Methyl-2-Pentanone	< 100	ug/kg	1/25/99	8260
Tetrachloroethene	< 25.0	ug/kg	1/25/99	8260
Dibromochloromethane	< 25.0	ug/kg	1/25/99	8260
Chlorobenzene	< 25.0	ug/kg	1/25/99	8260
Ethylbenzene	< 25.0	ug/kg	1/25/99	8260
Total Xylenes	< 25.0	ug/kg	1/25/99	8260
Styrene	< 25.0	ug/kg	1/25/99	8260
Bromoform	< 25.0	ug/kg	1/25/99	8260
1,1,2,2-Tetrachloroethane	< 25.0	ug/kg	1/25/99	8260
1,3-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,4-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
VOA TCLP Results:				
Vinyl Chloride (TCLP)	< 200	ug/L	2/ 8/99	8260
1,1-Dichloroethene (TCLP)	< 200	ug/L	2/ 8/99	8260
2-Butanone (TCLP)	< 800	ug/L	2/ 8/99	8260
Chloroform (TCLP)	< 200	ug/L	2/ 8/99	8260
Carbon Tetrachlor. (TCLP)	< 200	ug/L	2/ 8/99	8260
Benzene (TCLP)	< 200	ug/L	2/ 8/99	8260
1,2-Dichloroethane (TCLP)	< 200	ug/L	2/ 8/99	8260
Trichloroethene (TCLP)	< 200	ug/L	2/ 8/99	8260
Tetrachloroethene (TCLP)	< 200	ug/L	2/ 8/99	8260
Chlorobenzene (TCLP)	< 200	ug/L	2/ 8/99	8260
1,4-Dichlorobenz. (TCLP)	< 200	ug/L	2/ 8/99	8260

Metals results are reported on a dry weight basis

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991470
Lab Number: 99-D139

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/17/99
Date Collected: 1/21/99
Date Received: 1/22/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: SOIL GRAB OF BORING "HULETT-02" COLLECTED FROM 6.5-7 FT DEPTH
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 1,000	ug/kg	2/ 3/99	200.7
Arsenic, Total	3,580	ug/kg	2/ 4/99	206.2
Barium, Total	62,400	ug/kg	2/ 3/99	200.7
Cadmium, Total	254	ug/kg	2/ 3/99	200.7
Chromium, Total	31,900	ug/kg	2/ 3/99	200.7
Copper, Total	15,700	ug/kg	2/ 3/99	200.7
Mercury, Total	< 40.0	ug/kg	1/29/99	245.1
Nickel, Total	12,500	ug/kg	2/ 3/99	200.7
Lead, Total	38,100	ug/kg	2/ 3/99	239.2
Selenium, Total	< 1,000	ug/kg	2/ 4/99	270.2
VOA Results:				
Chloromethane	< 25.0	ug/kg	1/25/99	8260
Vinyl Chloride	< 25.0	ug/kg	1/25/99	8260
Bromomethane	< 25.0	ug/kg	1/25/99	8260
Chloroethane	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
Acetone	< 100	ug/kg	1/25/99	8260
Carbon Disulfide	< 25.0	ug/kg	1/25/99	8260
Methylene Chloride	< 100	ug/kg	1/25/99	8260
Methyl Tertiary Butyl Eth	< 25.0	ug/kg	1/25/99	8260
trans-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
2-Butanone	< 100	ug/kg	1/25/99	8260
cis-1,2-Dichloroethene	140	ug/kg	1/25/99	8260

Recycled Paper

Analysis Performed	Results		Analyzed	Method
Chloroform	< 25.0	ug/kg	1/25/99	8260
1,1,1-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
Carbon Tetrachloride	< 25.0	ug/kg	1/25/99	8260
Benzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
Trichloroethene	240	ug/kg	1/25/99	8260
1,2-Dichloropropane	< 25.0	ug/kg	1/25/99	8260
Bromodichloromethane	< 25.0	ug/kg	1/25/99	8260
2-Hexanone	< 100	ug/kg	1/25/99	8260
Trans-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
Toluene	< 25.0	ug/kg	1/25/99	8260
CIS-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
1,1,2-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
4-Methyl-2-Pentanone	< 100	ug/kg	1/25/99	8260
Tetrachloroethene	< 25.0	ug/kg	1/25/99	8260
Dibromochloromethane	< 25.0	ug/kg	1/25/99	8260
Chlorobenzene	< 25.0	ug/kg	1/25/99	8260
Ethylbenzene	< 25.0	ug/kg	1/25/99	8260
Total Xylenes	< 25.0	ug/kg	1/25/99	8260
Styrene	< 25.0	ug/kg	1/25/99	8260
Bromoform	< 25.0	ug/kg	1/25/99	8260
1,1,2,2-Tetrachloroethane	< 25.0	ug/kg	1/25/99	8260
1,3-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,4-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260

Metals results are reported on a dry weight basis

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991471
Lab Number: 99-D140

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/24/99
Date Collected: 1/21/99
Date Received: 1/22/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: SOIL GRAB OF BORING "HULETT-04" COLLECTED FROM 7.5-8 FT DEPTH
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 1,000	ug/kg	2/ 3/99	200.7
Arsenic, Total	19,700	ug/kg	2/ 4/99	206.2
Barium, Total	750,000	ug/kg	2/ 3/99	200.7
Cadmium, Total	4,520	ug/kg	2/ 3/99	200.7
Chromium, Total	68,900	ug/kg	2/ 3/99	200.7
Copper, Total	64,300	ug/kg	2/ 3/99	200.7
Mercury, Total	195	ug/kg	1/29/99	245.1
Nickel, Total	90,100	ug/kg	2/ 3/99	200.7
Lead, Total	325,000	ug/kg	2/ 3/99	239.2
Selenium, Total	< 1,000	ug/kg	2/ 4/99	270.2
Barium, TCLP	628	ug/L	2/19/99	200.7
Lead, TCLP	< 25.0	ug/L	2/19/99	239.2
VOA Results:				
Chloromethane	< 25.0	ug/kg	1/26/99	8260
Vinyl Chloride	< 25.0	ug/kg	1/26/99	8260
Bromomethane	< 25.0	ug/kg	1/26/99	8260
Chloroethane	< 25.0	ug/kg	1/26/99	8260
1,1-Dichloroethene	< 25.0	ug/kg	1/26/99	8260
Acetone	< 100	ug/kg	1/26/99	8260
Carbon Disulfide	< 25.0	ug/kg	1/26/99	8260
Methylene Chloride	< 100	ug/kg	1/26/99	8260
Methyl Tertiary Butyl Eth	< 25.0	ug/kg	1/26/99	8260
trans-1,2-Dichloroethene	< 25.0	ug/kg	1/26/99	8260
1,1-Dichloroethane	< 25.0	ug/kg	1/26/99	8260

Recycled Paper

Analysis Performed	Results		Analyzed	Method
2-Butanone	< 100	ug/kg	1/26/99	8260
cis-1,2-Dichloroethene	< 25.0	ug/kg	1/26/99	8260
Chloroform	< 25.0	ug/kg	1/26/99	8260
1,1,1-Trichloroethane	< 25.0	ug/kg	1/26/99	8260
Carbon Tetrachloride	< 25.0	ug/kg	1/26/99	8260
Benzene	< 25.0	ug/kg	1/26/99	8260
1,2-Dichloroethane	< 25.0	ug/kg	1/26/99	8260
Trichloroethene	< 25.0	ug/kg	1/26/99	8260
1,2-Dichloropropane	< 25.0	ug/kg	1/26/99	8260
Bromodichloromethane	< 25.0	ug/kg	1/26/99	8260
2-Hexanone	< 100	ug/kg	1/26/99	8260
Trans-1,3-Dichloropropene	< 25.0	ug/kg	1/26/99	8260
Toluene	< 25.0	ug/kg	1/26/99	8260
CIS-1,3-Dichloropropene	< 25.0	ug/kg	1/26/99	8260
1,1,2-Trichloroethane	< 25.0	ug/kg	1/26/99	8260
4-Methyl-2-Pentanone	< 100	ug/kg	1/26/99	8260
Tetrachloroethene	< 25.0	ug/kg	1/26/99	8260
Dibromochloromethane	< 25.0	ug/kg	1/26/99	8260
Chlorobenzene	< 25.0	ug/kg	1/26/99	8260
Ethylbenzene	< 25.0	ug/kg	1/26/99	8260
Total Xylenes	< 25.0	ug/kg	1/26/99	8260
Styrene	< 25.0	ug/kg	1/26/99	8260
Bromoform	< 25.0	ug/kg	1/26/99	8260
1,1,2,2-Tetrachloroethane	< 25.0	ug/kg	1/26/99	8260
1,3-Dichlorobenzene	< 25.0	ug/kg	1/26/99	8260
1,4-Dichlorobenzene	< 25.0	ug/kg	1/26/99	8260
1,2-Dichlorobenzene	< 25.0	ug/kg	1/26/99	8260

Metals results are reported on a dry weight basis

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991472
Lab Number: 99-D141

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/24/99
Date Collected: 1/21/99
Date Received: 1/22/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: SOIL GRAB OF BORING "HULETT-07" COLLECTED FROM 5.5-6 FT DEPTH
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 1,000	ug/kg	2/ 3/99	200.7
Arsenic, Total	17,200	ug/kg	2/ 4/99	206.2
Barium, Total	257,000	ug/kg	2/ 3/99	200.7
Cadmium, Total	304	ug/kg	2/ 3/99	200.7
Chromium, Total	73,300	ug/kg	2/ 3/99	200.7
Copper, Total	38,800	ug/kg	2/ 3/99	200.7
Mercury, Total	141	ug/kg	1/29/99	245.1
Nickel, Total	36,200	ug/kg	2/ 3/99	200.7
Lead, Total	80,100	ug/kg	2/ 3/99	239.2
Selenium, Total	< 1,000	ug/kg	2/ 4/99	270.2
Lead, TCLP	< 25.0	ug/L	2/19/99	239.2
VOA Results:				
Chloromethane	< 25.0	ug/kg	1/26/99	8260
Vinyl Chloride	< 25.0	ug/kg	1/26/99	8260
Bromomethane	< 25.0	ug/kg	1/26/99	8260
Chloroethane	< 25.0	ug/kg	1/26/99	8260
1,1-Dichloroethene	< 25.0	ug/kg	1/26/99	8260
Acetone	< 100	ug/kg	1/26/99	8260
Carbon Disulfide	< 25.0	ug/kg	1/26/99	8260
Methylene Chloride	< 100	ug/kg	1/26/99	8260
Methyl Tertiary Butyl Eth	< 25.0	ug/kg	1/26/99	8260
trans-1,2-Dichloroethene	< 25.0	ug/kg	1/26/99	8260
1,1-Dichloroethane	< 25.0	ug/kg	1/26/99	8260
2-Butanone	< 100	ug/kg	1/26/99	8260

Recycled Paper

Lab Number: 99-D141
Sample Number: 991472
February 24, 1999

Analysis Performed	Results		Analyzed	Method
cis-1,2-Dichloroethene	110	ug/kg	1/26/99	8260
Chloroform	< 25.0	ug/kg	1/26/99	8260
1,1,1-Trichloroethane	< 25.0	ug/kg	1/26/99	8260
Carbon Tetrachloride	< 25.0	ug/kg	1/26/99	8260
Benzene	< 25.0	ug/kg	1/26/99	8260
1,2-Dichloroethane	< 25.0	ug/kg	1/26/99	8260
Trichloroethene	120	ug/kg	1/26/99	8260
1,2-Dichloropropane	< 25.0	ug/kg	1/26/99	8260
Bromodichloromethane	< 25.0	ug/kg	1/26/99	8260
2-Hexanone	< 100	ug/kg	1/26/99	8260
Trans-1,3-Dichloropropene	< 25.0	ug/kg	1/26/99	8260
Toluene	< 25.0	ug/kg	1/26/99	8260
CIS-1,3-Dichloropropene	< 25.0	ug/kg	1/26/99	8260
1,1,2-Trichloroethane	< 25.0	ug/kg	1/26/99	8260
4-Methyl-2-Pentanone	< 100	ug/kg	1/26/99	8260
Tetrachloroethene	< 25.0	ug/kg	1/26/99	8260
Dibromochloromethane	< 25.0	ug/kg	1/26/99	8260
Chlorobenzene	< 25.0	ug/kg	1/26/99	8260
Ethylbenzene	< 25.0	ug/kg	1/26/99	8260
Total Xylenes	< 25.0	ug/kg	1/26/99	8260
Styrene	< 25.0	ug/kg	1/26/99	8260
Bromoform	< 25.0	ug/kg	1/26/99	8260
1,1,2,2-Tetrachloroethane	< 25.0	ug/kg	1/26/99	8260
1,3-Dichlorobenzene	< 25.0	ug/kg	1/26/99	8260
1,4-Dichlorobenzene	< 25.0	ug/kg	1/26/99	8260
1,2-Dichlorobenzene	< 25.0	ug/kg	1/26/99	8260

Metals results are reported on a dry weight basis

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

PO. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991473
Lab Number: 99-D142

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/17/99
Date Collected: 1/21/99
Date Received: 1/22/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: SOIL GRAB OF BORING "HULETT-09" COLLECTED FROM 6-7 FT DEPTH
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 1,000	ug/kg	2/ 3/99	200.7
Arsenic, Total	9,680	ug/kg	2/ 4/99	206.2
Barium, Total	103,000	ug/kg	2/ 3/99	200.7
Cadmium, Total	< 200	ug/kg	2/ 3/99	200.7
Chromium, Total	58,200	ug/kg	2/ 3/99	200.7
Copper, Total	6,470	ug/kg	2/ 3/99	200.7
Mercury, Total	< 40.0	ug/kg	1/29/99	245.1
Nickel, Total	9,760	ug/kg	2/ 3/99	200.7
Lead, Total	39,100	ug/kg	2/ 3/99	239.2
Selenium, Total	< 1,000	ug/kg	2/ 4/99	270.2
VOA Results:				
Chloromethane	< 25.0	ug/kg	1/25/99	8260
Vinyl Chloride	< 25.0	ug/kg	1/25/99	8260
Bromomethane	< 25.0	ug/kg	1/25/99	8260
Chloroethane	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
Acetone	< 100	ug/kg	1/25/99	8260
Carbon Disulfide	< 25.0	ug/kg	1/25/99	8260
Methylene Chloride	< 100	ug/kg	1/25/99	8260
Methyl Tertiary Butyl Eth	< 25.0	ug/kg	1/25/99	8260
trans-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
2-Butanone	< 100	ug/kg	1/25/99	8260
cis-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260

Recycled Paper

Lab Number: 99-D142
Sample Number: 991473
February 17, 1999

Analysis Performed	Results		Analyzed	Method
Chloroform	< 25.0	ug/kg	1/25/99	8260
1,1,1-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
Carbon Tetrachloride	< 25.0	ug/kg	1/25/99	8260
Benzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
Trichloroethene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloropropane	< 25.0	ug/kg	1/25/99	8260
Bromodichloromethane	< 25.0	ug/kg	1/25/99	8260
2-Hexanone	< 100	ug/kg	1/25/99	8260
Trans-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
Toluene	< 25.0	ug/kg	1/25/99	8260
CIS-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
1,1,2-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
4-Methyl-2-Pentanone	< 100	ug/kg	1/25/99	8260
Tetrachloroethene	< 25.0	ug/kg	1/25/99	8260
Dibromochloromethane	< 25.0	ug/kg	1/25/99	8260
Chlorobenzene	< 25.0	ug/kg	1/25/99	8260
Ethylbenzene	< 25.0	ug/kg	1/25/99	8260
Total Xylenes	< 25.0	ug/kg	1/25/99	8260
Styrene	< 25.0	ug/kg	1/25/99	8260
Bromoform	< 25.0	ug/kg	1/25/99	8260
1,1,2,2-Tetrachloroethane	< 25.0	ug/kg	1/25/99	8260
1,3-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,4-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260

Metals results are reported on a dry weight basis

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M. Mahfood, Director

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991474
Lab Number: 99-D143

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/17/99
Date Collected: 1/21/99
Date Received: 1/22/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: SOIL GRAB OF BORING "HULETT-09" COLLECTED FROM 6-7 FT DEPTH (REPLICATE)
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 1,000	ug/kg	2/ 3/99	200.7
Arsenic, Total	4,600	ug/kg	2/ 4/99	206.2
Barium, Total	132,000	ug/kg	2/ 3/99	200.7
Cadmium, Total	204	ug/kg	2/ 3/99	200.7
Chromium, Total	39,800	ug/kg	2/ 3/99	200.7
Copper, Total	8,560	ug/kg	2/ 3/99	200.7
Mercury, Total	< 40.0	ug/kg	1/29/99	245.1
Nickel, Total	12,400	ug/kg	2/ 3/99	200.7
Lead, Total	61,800	ug/kg	2/ 3/99	239.2
Selenium, Total	< 1,000	ug/kg	2/ 4/99	270.2
VOA Results:				
Chloromethane	< 25.0	ug/kg	1/25/99	8260
Vinyl Chloride	< 25.0	ug/kg	1/25/99	8260
Bromomethane	< 25.0	ug/kg	1/25/99	8260
Chloroethane	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
Acetone	< 100	ug/kg	1/25/99	8260
Carbon Disulfide	< 25.0	ug/kg	1/25/99	8260
Methylene Chloride	< 100	ug/kg	1/25/99	8260
Methyl Tertiary Butyl Eth	< 25.0	ug/kg	1/25/99	8260
trans-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
1,1-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
2-Butanone	< 100	ug/kg	1/25/99	8260

Recycled Paper

Analysis Performed	Results		Analyzed	Method
cis-1,2-Dichloroethene	< 25.0	ug/kg	1/25/99	8260
Chloroform	< 25.0	ug/kg	1/25/99	8260
1,1,1-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
Carbon Tetrachloride	< 25.0	ug/kg	1/25/99	8260
Benzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloroethane	< 25.0	ug/kg	1/25/99	8260
Trichloroethene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichloropropane	< 25.0	ug/kg	1/25/99	8260
Bromodichloromethane	< 25.0	ug/kg	1/25/99	8260
2-Hexanone	< 100	ug/kg	1/25/99	8260
Trans-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
Toluene	< 25.0	ug/kg	1/25/99	8260
CIS-1,3-Dichloropropene	< 25.0	ug/kg	1/25/99	8260
1,1,2-Trichloroethane	< 25.0	ug/kg	1/25/99	8260
4-Methyl-2-Pentanone	< 100	ug/kg	1/25/99	8260
Tetrachloroethene	< 25.0	ug/kg	1/25/99	8260
Dibromochloromethane	< 25.0	ug/kg	1/25/99	8260
Chlorobenzene	< 25.0	ug/kg	1/25/99	8260
Ethylbenzene	< 25.0	ug/kg	1/25/99	8260
Total Xylenes	< 25.0	ug/kg	1/25/99	8260
Styrene	< 25.0	ug/kg	1/25/99	8260
Bromoform	< 25.0	ug/kg	1/25/99	8260
1,1,2,2-Tetrachloroethane	< 25.0	ug/kg	1/25/99	8260
1,3-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,4-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260
1,2-Dichlorobenzene	< 25.0	ug/kg	1/25/99	8260

Metals results are reported on a dry weight basis

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Mel Carnahan, Governor • Stephen M Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 991475
Lab Number: 99-D144

Reported To: BRIAN ALLEN
Affiliation: ESP
Project Code: 4054/9096

Report Date: 2/24/99
Date Collected: 1/21/99
Date Received: 1/22/99

Sample Collected by: BRIAN ALLEN, ESP
Sampling Location: FORMER HULETT LAGOON SITE
Sample Description: SOIL GRAB OF BORING "HULETT-10" COLLECTED FROM 10.5-11 FT DEPTH
County: CAMDEN

Analysis Performed	Results		Analyzed	Method
Silver, Total	< 1,000	ug/kg	2/ 3/99	200.7
Arsenic, Total	10,700	ug/kg	2/ 4/99	206.2
Barium, Total	203,000	ug/kg	2/ 3/99	200.7
Cadmium, Total	651	ug/kg	2/ 3/99	200.7
Chromium, Total	62,700	ug/kg	2/ 3/99	200.7
Copper, Total	36,800	ug/kg	2/ 3/99	200.7
Mercury, Total	94.7	ug/kg	1/29/99	245.1
Nickel, Total	32,500	ug/kg	2/ 3/99	200.7
Lead, Total	94,200	ug/kg	2/ 3/99	239.2
Selenium, Total	< 1,000	ug/kg	2/ 4/99	270.2
Lead, TCLP	< 25.0	ug/L	2/19/99	239.2
VOA Results:				
Chloromethane	< 25.0	ug/kg	1/26/99	8260
Vinyl Chloride	< 25.0	ug/kg	1/26/99	8260
Bromomethane	< 25.0	ug/kg	1/26/99	8260
Chloroethane	< 25.0	ug/kg	1/26/99	8260
1,1-Dichloroethene	< 25.0	ug/kg	1/26/99	8260
Acetone	< 100	ug/kg	1/26/99	8260
Carbon Disulfide	< 25.0	ug/kg	1/26/99	8260
Methylene Chloride	< 100	ug/kg	1/26/99	8260
Methyl Tertiary Butyl Eth	< 25.0	ug/kg	1/26/99	8260
trans-1,2-Dichloroethene	< 25.0	ug/kg	1/26/99	8260
1,1-Dichloroethane	< 25.0	ug/kg	1/26/99	8260
2-Butanone	< 100	ug/kg	1/26/99	8260

Recycled Paper

Analysis Performed	Results		Analyzed	Method
cis-1,2-Dichloroethene	< 25.0	ug/kg	1/26/99	8260
Chloroform	< 25.0	ug/kg	1/26/99	8260
1,1,1-Trichloroethane	< 25.0	ug/kg	1/26/99	8260
Carbon Tetrachloride	< 25.0	ug/kg	1/26/99	8260
Benzene	< 25.0	ug/kg	1/26/99	8260
1,2-Dichloroethane	< 25.0	ug/kg	1/26/99	8260
Trichloroethene	< 25.0	ug/kg	1/26/99	8260
1,2-Dichloropropane	< 25.0	ug/kg	1/26/99	8260
Bromodichloromethane	< 25.0	ug/kg	1/26/99	8260
2-Hexanone	< 100	ug/kg	1/26/99	8260
Trans-1,3-Dichloropropene	< 25.0	ug/kg	1/26/99	8260
Toluene	< 25.0	ug/kg	1/26/99	8260
CIS-1,3-Dichloropropene	< 25.0	ug/kg	1/26/99	8260
1,1,2-Trichloroethane	< 25.0	ug/kg	1/26/99	8260
4-Methyl-2-Pentanone	< 100	ug/kg	1/26/99	8260
Tetrachloroethene	< 25.0	ug/kg	1/26/99	8260
Dibromochloromethane	< 25.0	ug/kg	1/26/99	8260
Chlorobenzene	< 25.0	ug/kg	1/26/99	8260
Ethylbenzene	< 25.0	ug/kg	1/26/99	8260
Total Xylenes	< 25.0	ug/kg	1/26/99	8260
Styrene	< 25.0	ug/kg	1/26/99	8260
Bromoform	< 25.0	ug/kg	1/26/99	8260
1,1,2,2-Tetrachloroethane	< 25.0	ug/kg	1/26/99	8260
1,3-Dichlorobenzene	< 25.0	ug/kg	1/26/99	8260
1,4-Dichlorobenzene	< 25.0	ug/kg	1/26/99	8260
1,2-Dichlorobenzene	< 25.0	ug/kg	1/26/99	8260

Metals results are reported on a dry weight basis

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: VALERIE WILDER, HWP

Modine - Camdenton HW-TSD File

Former Hulett Lagoon Site
Combined PA/SI
Reference 41

DAMES & MOORE
721 EMERSON ROAD, SUITE 220, ST. LOUIS, MISSOURI 63141
(314) 993-4599 FAX (314) 993-4895

November 4, 1996

Mr. Richard Nussbaum, P.E.
Groundwater Enforcement Unit Chief
Missouri Department of Natural Resources
Division of Environmental Quality
Hazardous Waste Program
P. O. Box 176
Jefferson City, Missouri 65102-0176

RECEIVED
NOV 05 1996
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Re: Letter Report
Subsurface Investigation
Former Hulett Lagoon
Camdenton, Missouri
Dames & Moore Job No. 27397-023-045

Dear Mr. Nussbaum:

On behalf of Modine Manufacturing Company (Modine), Dames & Moore is pleased to submit this letter report summarizing the results of the Subsurface Investigation at the former Hulett Lagoon in Camdenton, Missouri. The former city owned and operated lagoon is located approximately 1,000 feet northeast of the Modine Heat Transfer facility. Based upon the results of the field fracture survey, the former lagoon is strongly indicated as the source of the observed trichloroethene (TCE) impact to groundwater at the Modine facility. The purpose of this investigation was to determine the presence or absence of volatile organic compounds (VOCs), in particular TCE, in soil underlying the former Hulett Lagoon.

The field investigation was conducted on October 11, 1996. Four hydraulically driven probes were advanced in the area of the lagoon in which an inlet pipe from the former Sundstrand facility and an outlet or discharge pipe from the lagoon were previously located. A figure is attached illustrating the probe locations. The probes were continuously sampled and field screened using a photoionization detector (PID). The probe logs are included as an attachment to this letter report. The sample exhibiting the highest indication of VOC content from each probe was submitted to Inchcape Testing Services Environmental Laboratories in Richardson, Texas. The soil samples were analyzed for VOCs, with TCE as the primary constituent of concern. The samples were shipped in an iced cooler under proper chain of custody by an overnight courier.

The analytical report is included as an attachment to this letter and the analytical results summarized below.

Sample Location	Depth	Analyte Detected	Concentration in parts per billion (ppb)
GP-1	4-6'	Chloroform	200
		TCE	9,170
GP-2	4-5.5'	TCE	1,940
GP-3	4-5'	Chloroform	9.4
		cis-1,2-Dichloroethene	91.4
		TCE	Not detected
GP-4	4-6'	TCE	Not detected

The TCE concentrations encountered in the soil beneath the former lagoon supports our previous position of an off-site source as the source of the observed TCE impact to groundwater at the Modine facility This analytical data and the geological data resulting from the field fracture survey strongly suggests that the former lagoon is the off-site source.

If you have any questions or comments regarding the contents of this report, please contact either of the undersigned or Mr. Thomas Sanicola with Modine at (414) 636-1649.

Very truly yours,

DAMES & MOORE

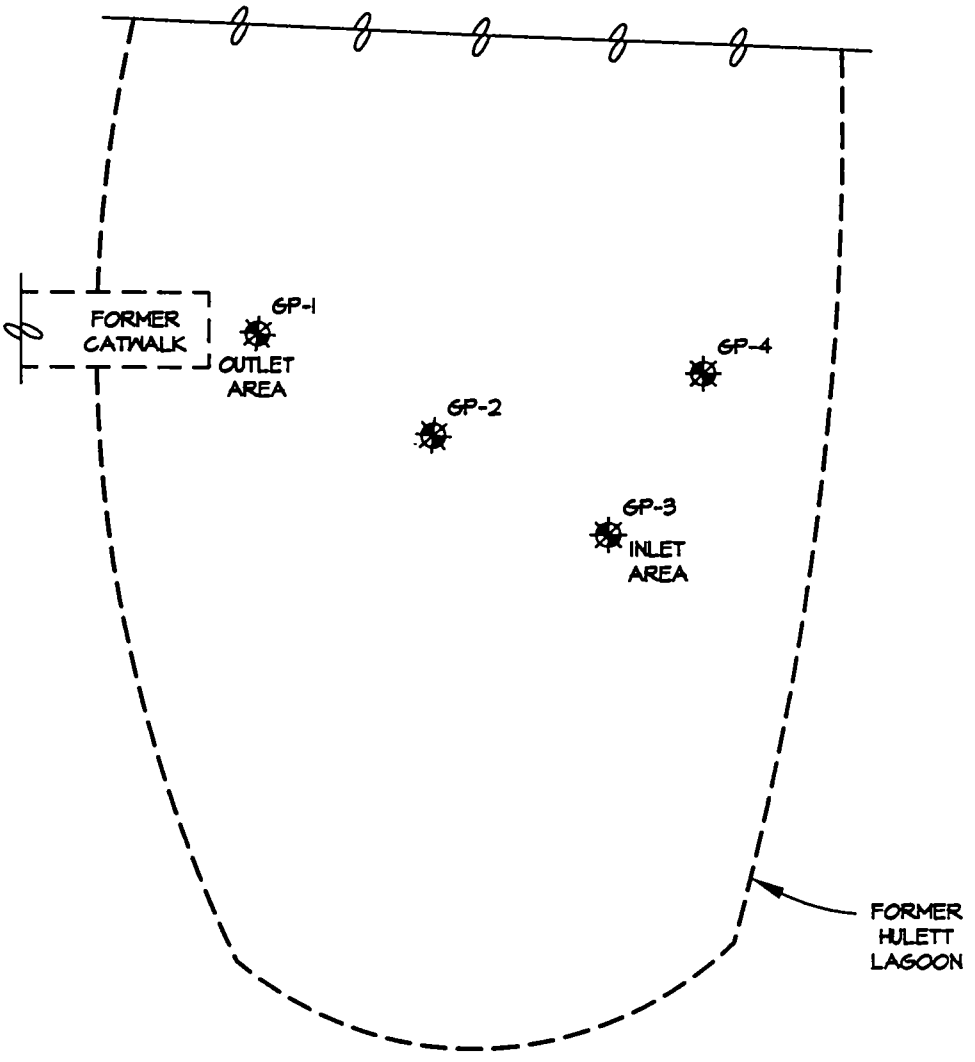
Miesche M. Francis
Assistant Geologist

Daniel J. Price, P.G.
Senior Geologist

DJP:lk
Attachments
cc: Darleen Westcott - MDNR
Thomas Sanicola - Modine
P \045\NOV96\MISC\NUSSBA04.RPT

ATTACHMENT 1

FIGURE





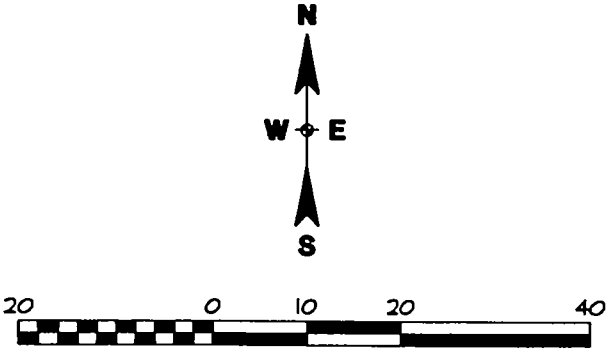


FIGURE 1
GEOPROBE LOCATIONS

FORMER HULETT LAGOON
MODINE MANUFACTURING CO.
CAMDENTON, MISSOURI

DATE: Oct. 30, 1996	
JOB NO.: 27397-023-045	
DRAWN BY: JMS	CHK'D BY: DJP
SCALE: 1" = 20'	

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
721 EMERSON ROAD, SUITE 220
ST. LOUIS, MISSOURI 63141
PHONE: 314-993-4599
FAX: 314-993-4895

P:\CADD-J\27397\023\023PF161.DWG, 10/30/96

ATTACHMENT 2

PROBE LOGS

Client: Modine Heat Transfer, Inc.
Project Number: 27397-023-045
Project: TCE Investigation Former Hulett Lagoon
Location: Camdenton, Missouri
Driller: GeoEnvironmental
Borehole Logged By: Miesche Francis
Drilling Method: GeoProbe®
Date Installed: October 11, 1996
Surface Conditions: Grass

PROBE ID GP-1

Monitoring Well Data:
Pipe:
Screen:
Slot:
Sand:

Elevation:
Datum:
Ground Surface:
Measuring Pt:
Top of Casing:

Sample Type
CT - Cuttings
SS - Split Spoon
WA - Wash Sample
CC - Continuos Core
RX - Rock Core
ST - Shelby Tube

DESCRIPTION	USCS	Stratigraphy	Depth (ft.)	OVM (ppm)	Completion	Sample Lab	Sample Interval	Sample Type
0' - 1" Top soil, with organic material, slight organic odor. 1" - 4' CLAY, yellowish red, with cherty gravel, soft, moist, slight solvent odor at 4'.	CL		0 1 2 3	142.6	GRANULAR BENTONITE			
4'-6' CLAY, yellowish red, with cherty gravel, with cherty gravel, trace of organic material, tight, dry, slight solvent odor. Refusal at 6'.			4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	1999		Y	4'-6'	CC

Note: This borehole was prepared for hydrogeological and/or environmental assessment purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by Dames & Moore personnel before use by others.

Client: Modine Heat Transfer, Inc.
Project Number: 27397-023-045
Project: TCE Investigation Former Hulett Lagoon
Location: Camdenton, Missouri
Driller: GeoEnvironmental
Borehole Logged By: Miesche Francis
Drilling Method: GeoProbe®
Date Installed: October 11, 1996
Surface Conditions: Grass

PROBE ID GP-2

Monitoring Well Data:	Elevation:
Pipe:	Datum:
Screen:	Ground Surface:
Slot:	Measuring Pt:
Sand:	Top of Casing:

Sample Type
CT - Cuttings
SS - Split Spoon
WA - Wash Sample
CC - Continuos Core
RX - Rock Core
ST - Shelby Tube

DESCRIPTION	USCS	Stratigraphy	Depth (ft.)	OVM (ppm)	Completion	Sample		
						Lab	Interval	Type
0'-4' CLAY, yellowish red, with cherty gravel, soft, moist, abundant organics at 3', musty odor (2' of recovery).	CL		0 1 2 3	6.80	GRANULAR BENTONITE			
4'-5 1/2' CLAY, yellowish red, with cherty gravel, tight, dry, trace of organic material, slight solvent odor.			4 5	648.3		Y	4'-51/2'	CC
Refusal at 5 1/2'.			6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25					

Note: This borehole was prepared for hydrogeological and/or environmental assessment purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by Dames & Moore personnel before use by others.

Client: Modine Heat Transfer, Inc.
Project Number: 27397-023-045
Project: TCE Investigation Former Hulett Lagoon
Location: Camdenton, Missouri
Driller: GeoEnvironmental
Borehole Logged By: Miesche Francis
Drilling Method: GeoProbe®
Date Installed: October 11, 1996
Surface Conditions: Grass

PROBE ID GP-3

Monitoring Well Data:
Pipe:
Screen:
Slot:
Sand:

Elevation:
Datum:
Ground Surface:
Measuring Pt:
Top of Casing:

Sample Type
CT - Cuttings
SS - Split Spoon
WA - Wash Sample
CC - Continuos Core
RX - Rock Core
ST - Shelby Tube

DESCRIPTION	USCS	Stratigraphy	Depth (ft.)	OVM (ppm)	Completion	Sample Lab	Sample Interval	Sample Type
0'-1" Top soil with organic material. 1"-4' CLAY, yellowish red, with cherty gravel, lower 6" wet, black discoloration at 3.5' (organic material), light gray clay lens at 4' with slight spice odor (2' of recovery). 4'-5' CLAY, yellowish red, with cherty gravel, some areas of discoloration slight musty odor. Refusal at 5'.	CL		0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	2.8 75.4	GRANULAR BENTONITE	Y	4'-5'	CC

Note: This borehole was prepared for hydrogeological and/or environmental assessment purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by Dames & Moore personnel before use by others.

Client: Modine Heat Transfer, Inc.
Project Number: 27397-023-045
Project: TCE Investigation Former Hulett Lagoon
Location: Camdenton, Missouri
Driller: GeoEnvironmental
Borehole Logged By: Miesche Francis
Drilling Method: GeoProbe®
Date Installed: October 11, 1996
Surface Conditions: Grass

PROBE ID GP-4

Monitoring Well Data:	Elevation:
Pipe:	Datum:
Screen:	Ground Surface:
Slot:	Measuring Pt:
Sand:	Top of Casing:

Sample Type
CT - Cuttings
SS - Split Spoon
WA - Wash Sample
CC - Continuos Core
RX - Rock Core
ST - Shelby Tube

DESCRIPTION	USCS	Stratigraphy	Depth (ft.)	OVM (ppm)	Completion	Sample Lab	Sample Interval	Sample Type
0'-1" Top soil with organic material.			0					
1"-4' CLAY, yellowish red, with cherty gravel, moist, soft, sand lens at 4' with abundant organic material (2' of recovery).	CL		1	0.0	GRANULAR BENTONITE			
			2					
			3					
4'-6' CLAY, yellowish red, with cherty gravel, moist, tight.			4	0.4		Y	4'-6'	CC
			5					
Refusal at 6'.			6					
			7					
			8					
			9					
			10					
			11					
			12					
			13					
			14					
			15					
			16					
			17					
			18					
			19					
			20					
			21					
			22					
			23					
			24					
			25					

Note: This borehole was prepared for hydrogeological and/or environmental assessment purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by Dames & Moore personnel before use by others.

ATTACHMENT 3

ANALYTICAL REPORT

Inchcape Testing Services
Environmental Laboratories

1089 E Collins Blvd.
Richardson, TX 75081
Tel 214-238-5591
Fax 214-238-5592

ANALYTICAL REPORT

DATE RECEIVED : 12-OCT-1996
REPORT NUMBER : D96-11513
REPORT DATE : 22-OCT-1996

SAMPLE SUBMITTED BY : Dames & Moore
ADDRESS : 2135 East Sunshine, Suite #150
: Springfield, MO 65804
ATTENTION : Miesche Francis
PROJECT : 27397-023 Modine Hulett Lagoon

Included in this data package are the analytical results for the sample group which you have submitted to Inchcape Testing Services for analysis. These results are representative of the samples as received by the laboratory.

The information contained herein has undergone extensive review and is deemed accurate and complete. Sample analysis and quality control were performed in accordance with all applicable protocols. Any deviations from these protocols or observations of interest are detailed in an accompanying Case Narrative. Please refrain from reproducing this report except in its entirety.

If you have any questions regarding this report and its associated materials please call your Project Manager at (214) 238-5591.

We appreciate the opportunity to serve you and look forward to providing continued service in the future.

Martin Jeffus
General Manager

DAMES & MOORE
OCT 25 1996
SPRINGFIELD, MO
OCT 31 1996
ST. LOUIS, MISSOURI

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 12-OCT-1996

REPORT NUMBER : D96-11513-1
REPORT DATE : 22-OCT-1996

SAMPLE SUBMITTED BY : Dames & Moore
ADDRESS : 2135 East Sunshine, Suite #150
: Springfield, MO 65804
ATTENTION : Miesche Francis

SAMPLE MATRIX : Soil
ID MARKS : GP-1 4-6'
PROJECT : 27397-023 Modine Hulett Lagoon
DATE SAMPLED : 11-OCT-1996
ANALYSIS METHOD : EPA 8010 /1
ANALYZED BY : JCH
ANALYZED ON : 15-OCT-1996
DILUTION FACTOR : 100
METHOD FACTOR : 10
QC BATCH NO : 4-101496

VOLATILE HALOCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Chloroform	100 µg/Kg	200 µg/Kg
Trichloroethene	100 µg/Kg	9170 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene (SS)	10.0 µg/Kg	114 %

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 12-OCT-1996

REPORT NUMBER : D96-11513-1
REPORT DATE : 22-OCT-1996

SAMPLE SUBMITTED BY : Dames & Moore
ADDRESS : 2135 East Sunshine, Suite #150
: Springfield, MO 65804
ATTENTION : Miesche Francis

SAMPLE MATRIX : Soil
ID MARKS : GP-1 4-6'
PROJECT : 27397-023 Modine Hulett Lagoon
DATE SAMPLED : 11-OCT-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	80.5 %
Analyzed using ASTM D2216 mod. on 17-OCT-1996 by SAB QC Batch No : 888064A			

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 12-OCT-1996

REPORT NUMBER : D96-11513-2
REPORT DATE : 22-OCT-1996

SAMPLE SUBMITTED BY : Dames & Moore
ADDRESS : 2135 East Sunshine, Suite #150
: Springfield, MO 65804
ATTENTION : Miesche Francis

SAMPLE MATRIX : Soil
ID MARKS : GP-2 4-5.5'
PROJECT : 27397-023 Modine Hulett Lagoon
DATE SAMPLED : 11-OCT-1996
ANALYSIS METHOD : EPA 8010 /1
ANALYZED BY : JCH
ANALYZED ON : 15-OCT-1996
DILUTION FACTOR : 100
METHOD FACTOR : 10
QC BATCH NO : 4-101496

VOLATILE HALOCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Trichloroethene	100 µg/Kg	1940 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene (SS)	10.0 µg/Kg	130 %

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 12-OCT-1996

REPORT NUMBER : D96-11513-2
REPORT DATE : 22-OCT-1996

SAMPLE SUBMITTED BY : Dames & Moore
ADDRESS : 2135 East Sunshine, Suite #150
: Springfield, MO 65804
ATTENTION : Miesche Francis

SAMPLE MATRIX : Soil
ID MARKS : GP-2 4-5.5'
PROJECT : 27397-023 Modine Hulett Lagoon
DATE SAMPLED : 11-OCT-1996

MISCELLANEOUS ANALYSES

TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	73.6 %

Analyzed using ASTM D2216 mod. on 17-OCT-1996 by SAB
QC Batch No : 888064A

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 12-OCT-1996

REPORT NUMBER : D96-11513-3
REPORT DATE : 22-OCT-1996

SAMPLE SUBMITTED BY : Dames & Moore
ADDRESS : 2135 East Sunshine, Suite #150
: Springfield, MO 65804
ATTENTION : Miesche Francis

SAMPLE MATRIX : Soil
ID MARKS : GP-3 4-5'
PROJECT : 27397-023 Modine Hulett Lagoon
DATE SAMPLED : 11-OCT-1996
ANALYSIS METHOD : EPA 8010 /1
ANALYZED BY : JCH
ANALYZED ON : 15-OCT-1996
DILUTION FACTOR : 5
METHOD FACTOR : 10
QC BATCH NO : 4-101496

VOLATILE HALOCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Chloroform	5.0 µg/Kg	9.4 µg/Kg
cis-1,2-Dichloroethene	5.0 µg/Kg	91.4 µg/Kg
Trichloroethene	5.0 µg/Kg	< 5.0 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene (SS)	10.0 µg/Kg	115 %

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 12-OCT-1996

REPORT NUMBER : D96-11513-3
REPORT DATE : 22-OCT-1996

SAMPLE SUBMITTED BY : Dames & Moore
ADDRESS : 2135 East Sunshine, Suite #150
: Springfield, MO 65804
ATTENTION : Miesche Francis

SAMPLE MATRIX : Soil
ID MARKS : GP-3 4-5'
PROJECT : 27397-023 Modine Hulett Lagoon
DATE SAMPLED : 11-OCT-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	78.7 %
Analyzed using ASTM D2216 mod. on 17-OCT-1996 by SAB QC Batch No : 888064A			

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 12-OCT-1996

REPORT NUMBER : D96-11513-4
REPORT DATE : 22-OCT-1996

SAMPLE SUBMITTED BY : Dames & Moore
ADDRESS : 2135 East Sunshine, Suite #150
: Springfield, MO 65804
ATTENTION : Miesche Francis

SAMPLE MATRIX : Soil
ID MARKS : GP-4 4-6'
PROJECT : 27397-023 Modine Hulett Lagoon
DATE SAMPLED : 11-OCT-1996
ANALYSIS METHOD : EPA 8010 /1
ANALYZED BY : JCH
ANALYZED ON : 15-OCT-1996
DILUTION FACTOR : 5
METHOD FACTOR : 10
QC BATCH NO : 4-101496

VOLATILE HALOCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Trichloroethene	5.0 µg/Kg	< 5.0 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene (SS)	10.0 µg/Kg	122 %

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 12-OCT-1996

REPORT NUMBER : D96-11513-4
REPORT DATE : 22-OCT-1996

SAMPLE SUBMITTED BY : Dames & Moore
ADDRESS : 2135 East Sunshine, Suite #150
: Springfield, MO 65804
ATTENTION : Miesche Francis

SAMPLE MATRIX : Soil
ID MARKS : GP-4 4-6'
PROJECT : 27397-023 Modine Hulett Lagoon
DATE SAMPLED : 11-OCT-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	72.4 %
Analyzed using ASTM D2216 mod. on 17-OCT-1996 by SAB QC Batch No : 888064A			

Inchcape Testing Services
Environmental Laboratories

REPORT DATE : 22-OCT-1996 REPORT NUMBER : D96-11513

SAMPLE SUBMITTED BY : Dames & Moore
ATTENTION : Miesche Francis
PROJECT : 27397-023 Modine Hulett Lagoon

LABORATORY QUALITY CONTROL REPORT

ANALYTE	Trichloroethene
BATCH NO.	4-101496
LCS LOT NO.	A8709-55B
PREP METHOD	---
PREPARED BY	---
ANALYSIS METHOD	EPA 8010
ANALYZED BY	JCH
UNITS	mg/Kg
METHOD BLANK	< 1.00
SPIKE LEVEL	500
MS RESULT	470
MS RECOVERY %	94.0
MSD RESULT	420
MSD RECOVERY %	84.0
MS/MSD RPD %	11.2
BS RESULT	NA
BS RECOVERY %	NA
BSD RESULT	NA
BSD RECOVERY %	NA
BS/BSD RPD %	NA
DUPLICATE RPD %	NA
LCS LEVEL	20.0
LCS RESULT	16.5
LCS RECOVERY %	82.5
SPIKE SAMPLE ID	11513-3
DUP SAMPLE ID	---

NA Not applicable

Inchca Testing Services Environmental Laboratories 1089 East Co' Blvd., #100 Richardson, TX 75081 (214) 238-5591 CHAIN OF CUSTC ECORD

Report to:		Invoice to	
Company:	Dames & Moore	Company:	
Address:	2135 E Sunshine #105 Springfield, MO 65804	Address:	Same as report.
Contact:	Miesche Francis	Contact:	
Phone:	(417) 881-3927	Phone:	
Fax:	(417) 881-6361	PO/SO #:	

Sampler's Name: Miesche Francis
Sampler's Signature: Miesche Francis

Proj. No: 27397-023
Project Name: Modine Hulett Lagoon
No /Type of Containers[2]

ANALYSIS REQUESTED: VOCs 8010 (TCE)

Lab use only
Due Date:
Temp of coolers when received (C°): 1 | 2 | 3 | 4 | 5
Custody Seal N / Y
Intact N / Y
Screened For Radioactivity

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt	250 ml	P/O	Lab Sample ID (Lab Use Only)
S	10-11	1145		✓	GP-1 4'-6'				V1	11513-1
S	10-11	1230		✓	GP-2 4-5½'				V1	-2
S	10-11	1211		✓	GP-3 4-5				V1	-3
S	10-11	1220		✓	GP-4 4-6'				V1	-4

Report only TCE unless other constituents are identified in significant quantities.

ORIGINAL

Turn around time: ☑ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418 1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date	Time	Received by (Signature)	Date	Time
Miesche Francis	10/11	1430	D. Fields	10-12	1000
Relinquished by: (Signature)	Date:	Time	Received by: (Signature)	Date	Time
Relinquished by (Signature)	Date	Time	Received by (Signature)	Date	Time

Remarks: * SEE ABOVE

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule

[1] Matrix: WW - Wastewater; W - Water; S - Soil; SD - Solid; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge; O - Oil
[2] Container: VOA - 40 ml vial; A/G - Amber / Or Glass 1 Liter; 250 ml - Glass wide mouth; P/O - Plastic or other_____

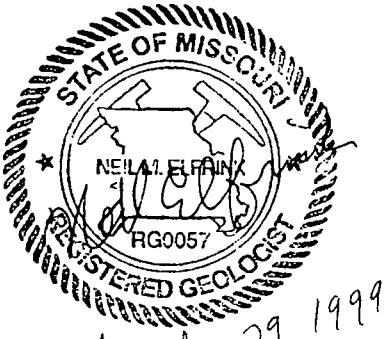
Inchcape cannot accept verbal changes. Please Fax written changes to 214-238-5592

OFFICE USE ONLY

FILE Former Hulett LagoonPA/SI Site
CamdenCounty

Former Hulett Lagoon Site
Combined PA/SI
Reference 43

STATE OF MISSOURI
Mel Carnahan Governor • Stephen M. Mahfood Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGY AND LAND SURVEY
P O Box 250 111 Fairgrounds Rd Rolla, MO 65402-0250
(573) 368-2100
FAX (573) 368-2111



March 29, 1999
p 1 of 12

MEMORANDUM

DATE: March 29, 1999

TO: Valerie Wilder, Environmental Specialist
Superfund Section, HWP, DEQ

FROM: Neil Elfrink, Geologist
Environmental Geology Section, GSP, DGLS

SUBJECT: Hydrogeologic Report for the Former Hulett Lagoon Site

LOCATION: SW 1/4, SW 1/4, SW 1/4, Section 24, T. 38 N , R. 17 W., Camden County, Missouri; 38° 00' 42" North Latitude and 92° 45' 18" West Longitude.

The hydrogeologic report for the Former Hulett Lagoon site is enclosed. Please contact me at (573) 368-2162 if you have any questions regarding this report, or if additional information is required.

NE/lh

Attachments

HYDROGEOLOGIC REPORT FOR THE FORMER HULETT LAGOON SITE CAMDENTON, MISSOURI, CAMDEN COUNTY

GENERAL CONSIDERATIONS

Site Location

The Former Hulett Lagoon site is located on the Green Bay Terrace 7.5-minute quadrangle map (Figure 1), in the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4) of the Southwest Quarter (SW 1/4) of Section 24, Township 38 North, Range 17 West. Coordinates for the center of the former lagoon are approximately 38° 00' 42" north latitude and 92° 45' 18" west longitude. The Former Hulett Lagoon site is located on the east side of Dawson Road, north of Sunset Drive. The site is approximately ¼ mile northeast of Modine Manufacturing Site (Modine).

Physiographic Province

The site is situated on the Salem Plateau region of the Ozark Plateau physiographic province (Missouri Water Atlas, 1986). The topography of the Salem Plateau is characterized by a rolling upland surface with rugged hills dissected by entrenched, narrow stream valleys (Gann, 1976). Karst features, such as springs, sinkholes, and losing streams, are characteristic of the Salem Plateau.

GROUNDWATER PATHWAY

Stratigraphic Units

A stratigraphic column (Table 1) has been tabulated based upon the stratigraphy of nearby wells (Well Log File, 1999).

The youngest bedrock formations beneath the site are expected to be Ordovician-age sediments assigned to the Canadian Series. The Roubidoux Formation consists of dolomite, sandy dolomite, and sandstone (Thompson, 1991). In the Camdenton area, soluble portions of the Roubidoux have generally been removed by dissolution. Nearby well logs indicate that the Roubidoux Formation may have been completely removed by erosion in the vicinity of the site.

Underlying the Roubidoux Formation, the Gasconade Dolomite consists of cherty dolomite and is estimated to be approximately 300 feet thick in the vicinity of the site (Well Logs, 1999). A basal unit of the Gasconade Dolomite, known as the Gunter Sandstone Member, commonly separates the Ordovician- and Cambrian-age strata. The Gunter Sandstone is approximately 25 feet thick in the Camdenton area.

Cambrian rocks in the Camdenton area were deposited in a complex depositional environment. Camdenton is located near the western margin of a Cambrian-age intrashelf sedimentary basin known as the Central Missouri Basin (Palmer and Hayes, 1997). To the west lies the north-south trending Lebanon Arch, which consists of carbonate platform rocks, that in some areas, thin over Precambrian highlands (Gregg et. al., 1989). Dramatically different lithologies and abrupt facies changes are depicted in area well logs (Figure 2). In general, more shaly, basinal rocks to the east pinch-out against the Lebanon Arch.

Because of the tectonic setting, Cambrian beds in the Camdenton area are difficult to categorize, and "layer-cake" stratigraphy should not be assumed. The following descriptions are simplified. The upper-most Cambrian unit in the area is the Eminence Dolomite, which consists of approximately 300 – 635 feet of dolomite with minor amounts of chert. The Eminence Dolomite is underlain by about 25 - 230 feet of Potosi Dolomite, which consists of dolomite, chert, and drusy quartz. Beneath the Potosi Dolomite, in descending order, are the Derby-Doerun Dolomite, the shaly Davis Formation, the Bonneterre Formation, and the Lamotte Sandstone. The entire Cambrian section is estimated to be over 1,150 feet thick.

Cross-sections constructed using information from specific well logs (Well Log Files, 1999) are presented in Figures 2 and 3. The cross-section locations are shown on Figures 1 and 4.

Aquifers

The Ozark Aquifer, which includes all bedrock units above the Cambrian-age Derby-Doerun Dolomite, is the shallowest aquifer beneath site. The Ozark Aquifer is considered exposed at the surface at the Former Hulett Lagoon Site. The total thickness of the aquifer is approximately 950 feet. Each of the units which comprise the Ozark Aquifer have individual characteristics that control their water-bearing capabilities; however, in general, the Ozark Aquifer produces good-quality water, with production rates generally proportional to well depth. Extensive pumping of groundwater in the Camdenton area has created a downward vertical gradient, and the site is located in a groundwater recharge zone.

Because detailed hydrogeologic studies have not been conducted at the site, groundwater flow directions within the bedrock can only be approximated. Prior to pumping of the aquifer, groundwater beneath the site probably flowed westward or northward to discharge areas in the Niangua River valley, (Imes, 1990, Sheet 3). Pumping rates at the Camdenton municipal wells are high enough to engulf the site within the cones of depression that surround the municipal wells. The radius of influence of nearby production wells should be determined.

Groundwater flow in the saturated zone is controlled by gradient. Assertions that preferential pathways in the Ozark Aquifer substantially influence flow direction in the saturated zone (Dames and Moore, 1996; page 13) are incorrect. Water flows downhill; fractures or solution-enlarged channels cannot make water flow uphill. Monitoring well nests are needed to accurately determine the magnitude of the downward vertical gradient. The upper Gasconade Dolomite *may* inhibit the downward migration of contamination. However, fracturing and karst development may have resulted in a local increase in permeability within the otherwise relatively tight upper Gasconade Dolomite.

The Gunter Sandstone is generally highly porous and permeable and is an important source of domestic groundwater supplies in the area. Because the Gunter Sandstone generally yields adequate domestic water supplies, few private wells in the area penetrate the underlying Cambrian Formations. However, municipal wells in the Lake of the Ozarks area are generally cased through the Gunter Sandstone, in order to avoid possible bacterial contamination.

The Eminence and Potosi Dolomites are a major source of municipal drinking water throughout the Ozark area, including the City of Camdenton. The Eminence Dolomite is differentiated from the underlying Potosi Dolomite by the lack of druse. A druse is a rock cavity encrusted with finely crystalline quartz. The druse-rich Potosi Dolomite is the most permeable geologic unit within the Ozark Aquifer and generally has an extensive network of karstic channels.

The shallowest reliable aquitard beneath the site is the St. Francois Confining Unit, approximately 1,200 feet below the surface. The St. Francois Confining Unit separates the Ozark Aquifer from the deeper St. Francois Aquifer. The St. Francois Aquifer includes the Cambrian-age Bonneterre Formation and Lamotte Sandstone. The St. Francois Aquifer is not used as a water source in Camden County. Water losses in the Lamotte Sandstone are common in some parts of the Ozark Region, although the phenomenon is poorly understood. Outside the Cambrian outcrop area, few water wells penetrate the Lamotte Sandstone, since yields may actually be reduced. Groundwater flow directions in the deeper St. Francois Aquifer are generally unknown and may be complicated.

Baseline water-level and pumping rate data needs to be collected before informed decisions about groundwater movement in the Camdenton subsurface can be made. Static water levels should be measured at least monthly at any inactive wells. Detailed records of active wells should include volume of water pumped, length of pumping cycles, and drawdown measurements. The Mulberry City Well (which was shut down on January 26, 1999 because of TCE contamination) produced approximately three times the volume of the other two city wells, suggesting the aquifer is highly heterogeneous. The Mulberry Well probably intercepted more solution-enlarged cavities than the other city wells, although lithologic differences can also explain differences in well yield. Wide variations in aquifer parameters are common in

carbonate areas.

The three Camdenton city wells produced a total of 232,458,000 gallons in 1997. An estimate of the cone of depression produced by this pumping can be made by comparing Camdenton to the city of Rolla, which is located in a similar ridge-top geologic setting approximately 50 miles east of Camdenton (Vandike, 1992). In 1960, four Rolla city wells produced approximately 290,250,000 gallons of water from the Ozark Aquifer. The resulting cone of depression was over five miles wide (Vandike, 1992). By 1960, pumping of the Ozark Aquifer in the Rolla area had dropped water levels up to 150 feet compared to the predevelopment potentiometric surface. The relatively deep depth to groundwater in the Camdenton area suggests a similar radius of effect can be expected. Any potential site-related contaminants reaching the water table are expected to move toward the nearest Camdenton City Well. Until recently, hydraulic control beneath the Former Hulett Lagoon and Modine sites has been maintained by pumping at the Mulberry Well. Now that the Mulberry Well has been shut off, TCE contamination is expected to move toward another city well.

Wells at the Modine site are open to different depth intervals. Therefore, data from these wells cannot be used to create a potentiometric map. The fact that two of the four wells have gone dry in the past suggests that the vertical flow component is significant. Water levels in area wells tend to decrease with depth, supporting the statement that the vertical flow is downward. As previously mentioned, a downward gradient is to be expected in an active municipal well field, particularly if it is located on a ridge top. Static water levels measured during the construction of the newest Camdenton City Well (# 7) also verify the downward gradient (Krehbiel Engineering, Inc., 1998). The Hickory Street Well is 1,100 feet deep with 462 feet of casing. The static water level before pressure-grout sealing of the well casing was 222 feet below the ground surface. Static water level after sealing was 260 feet below ground surface, indicating a downward vertical gradient. A large upland area that might provide recharge to the Camdenton City Wells does not exist. Groundwater monitored by the monitoring wells is essentially moving downward to recharge the pumping wells. Conclusions about lateral flow directions cannot be made based on water levels from the existing monitoring well network.

It has been suggested that contaminants reaching the saturated zone beneath Camdenton will follow "regional groundwater flow" and discharge at the Lake of the Ozarks (Dames & Moore, 1998; page 19). However, groundwater withdrawals averaging over 500,000 gallons per day will create a large cone of depression and obliterate "regional groundwater flow" in any Ozark ridge top setting. A 2-hour pump test of the new Hickory St. Well at 550 gpm caused a 176-foot drawdown in water level (Krehbiel Engineering, Inc., 1998). There is no evidence to suggest that potential contaminants reaching the water table from either the Former Hulett Lagoon or the Modine site can somehow escape the Camdenton well field.

Aquifer Discontinuities

Minor folds and faults in the area cannot be considered aquifer discontinuities. However, it should be noted that the Cambrian-age formations that form the most productive portions of the Ozark Aquifer beneath the site are highly variable in lithology. The aquifer cannot be considered isotropic, nor does it possess radial symmetry. Aquifer parameters may be so variable as to render groundwater modeling useless.

Wellhead Protection Area

The Former Hulett Lagoon site is located in a Wellhead Protection Area according to section 1428 of the Safe Drinking Water Act. In Missouri, Wellhead Protection Areas are designated by the Missouri Wellhead Protection Program. The Former Hulett Lagoon Area site is located within a 1-mile radius of a wellhead in a carbonate aquifer system (Public Drinking Water Program, 1994, page 15).

Revisions to the 1994 Missouri Wellhead Protection Program document are currently under review by EPA. However, the Former Hulett Lagoon site should remain in a designated Wellhead Protection Area under any new management program that may be approved.

In addition to the Wellhead Protection Area discussed above, Camdenton is also subject to Well Construction Rules under the Water Well Drillers Act, section 256.600 to 256.640 RSMo. Most of the Camdenton area is located in Area 1, as designated by the DGLS Wellhead Protection Section. Since September 1987, Area 1 bedrock wells have been required to have 80 feet of casing and penetrate at least 30 feet of bedrock. Wells within ¼ mile of the Lake of the Ozarks are located in Sensitive Area B and subject to additional requirements (Missouri Well Construction Rules, 1996).

Karst Features

The Camdenton area is considered karst (Missouri Water Atlas, 1986). Significant karst features are present within a 4-mile radius of the site. A monitoring well drilled at the site encountered numerous fractures and small voids (Dames & Moore, 1998). Over 5,000 gallons of water was lost during the drilling of the monitoring well.

Geologic Structures

Geophysical logging of monitoring wells at the Modine site suggests that formations beneath the site are essentially flat-lying. Small faults and folds have been mapped within a 4-mile target radius. The axis of a northwest-trending syncline, called the

Racetrack Hollow Syncline, has been mapped less than 2 miles south of the site (Brown, 1984). The Red Arrow Fault is located approximately 3 miles south of the site (Wedge, in preparation). The fault strikes northwest and, in general, the southwest side is downthrown approximately 100 feet. However, geology along the fault zone is complicated. LOGMAIN Well # 25162 (Figure 3) is located along the fault zone and indicates significant upward movement. Ha Ha Tonka Spring is located along the trace of The Red Arrow Fault.

The poorly defined Proctor anticline runs across Camden County (McCracken, 1971). The anticline is evident on the regional cross-section (Figure 3). The Proctor anticline roughly corresponds with the Lebanon Arch, an area of shallow-water carbonate deposition during the Cambrian Period. The anticline is probably related to a rejuvenated Precambrian fault. The effects of the structural deformation on groundwater are poorly understood, but the faulting and folding has probably increased hydraulic conductivities in some areas. Groundwater may flow along conduits within the structures.

Travel Time Factor

Rock layers that underlie the site are karst. The resulting Travel Time Factor Value is 35 (Federal Register, 1990).

GROUNDWATER TARGETS

Target Distance Limit

Groundwater use within the 4-mile groundwater target distance limit is extensive. The City of Camdenton has provided water service since 1952, with groundwater as the sole source of water. Most businesses and residences near the Former Hulett Lagoon site utilize on city water.

Wells

Over 195 well locations within the groundwater target distance limit are recorded in the databases available at the Division of Geology and Land Survey. The LOGMAIN database contains information on older wells. The DGLS Well Wellhead Protection Section's Water Well Information System (W.I.M.S) database contains information on wells drilled since 1987. Well site locations are presented on Figures 5 and 6, and the corresponding well data is tabulated in Table 2. Some locations may be estimated or based on section centroids. The vast majority of the wells on record are domestic supply wells. Some wells may no longer be active. Many active wells may not be recorded in DGLS databases.

According to databases available at DGLS, one private well is located with ¼ mile of the Former Hulett Lagoon Site. One community well is located with ½ mile of the Former Hulett Lagoon Site. A total of 4 wells are located between 0.5 and 1 mile of the site, including 2 community wells and 2 private wells. An additional 31 wells are located between 1 and 2 miles from the site, including 1 community well, 1 nontransient noncommunity well, 2 transient noncommunity wells and 27 private wells. 72 wells are located between 2 and 3 miles from the site, including 2 community wells, 1 nontransient noncommunity well, 9 transient noncommunity wells and 60 private wells. 96 wells are located between 3 and 4 miles of the site including 3 nontransient noncommunity well, 3 transient noncommunity wells and 90 private wells.

Nearest Wells

The nearest public drinking water supply well on record is The City of Camdenton Well #6 (Mulberry Well), located about 1/4 mile south of the Former Hulett Lagoon site. The well was closed in 1999 due to TCE contamination. The City of Camdenton has three other wells inside the 4-mile target distance limit. Total production from the three wells was 221,003,300 gallons in 1993. All of these wells draw water from the Ozark Aquifer.

The nearest possible private drinking water well on record is located approximately 1/4 mile east of the Former Hulett Lagoon site (Figure 5). The well was drilled in 1990 and its current status is unknown.

SURFACE WATER PATHWAY

Hydrologic Setting

The Former Hulett Lagoon site is situated near the headwaters of a small unnamed stream which drains southwest to the Niangua Arm of the Lake of the Ozarks. The site of the former lagoon has been leveled, while the surrounding terrain exhibits moderate natural relief (5% to 9% slopes). East of the site lies the City of Camdenton. West of the site, the landscape is more rugged, and forests extend down to the Lake of the Ozarks. The natural landforms and drainage patterns at the site have been obscured by lagoon construction and, later, by soil removal actions. Land use patterns for the surrounding upland areas near the Former Hulett Lagoon site include residential properties with some light-industrial and commercial use.

Rainfall Data

The average annual precipitation in the area of the Former Hulett Lagoon site is slightly more than 37 inches. Average annual run-off is around 10 inches, and

evapotranspiration amounts to about 28 inches per year; therefore, little precipitation is available for infiltration (Vandike, 1995). The 2-year, 24-hour rainfall for the area is about 3.5 inches (Rainfall Frequency Atlas, undated).

Surface Water Migration Path

Below the Former Hulett Lagoon Site, the receiving stream is fairly steep and the bedload consists mostly of cobbles and gravels. Any metals or solvents that may have reached the stream are unlikely to be detected in the sediments. Groundwater contamination is the main concern at the Former Hulett Lagoon Site.

In 1992 James Vandike, a DGLS geologist with the Water Resources Program, examined area streams as part of the Modine investigation (Vandike, March 18, 1992). The Former Hulett Lagoon site is located on the valley floor of an intermittent stream referred to by Van Dike as the "northeast branch" of an unnamed tributary to Jarvis Hollow (Figure 1). The "southeast branch" of the tributary drains the Modine site. The northeast and southeast branches join near the western corporate boundary of the City of Camdenton, approximately 0.6 miles downstream of the Former Hulett Lagoon Site. The lagoon was constructed near the headwaters of the northeast branch, just west of the ridge top where most of Camdenton is located. Water runs onto the site from the upper section of the northeast branch. This channel has been diverted around the northern edge of the former lagoon; thus, only the southern slope of the valley provides surface runoff to the site. The assigned Hazard Ranking System (HRS) Drainage Area Value is 1 (Federal Register, 1990).

Run-off from the site enters the northeast branch and flows toward the west for ¼ mile. Runoff then flows southwest approximately 1.6 miles and enters Jarvis Hollow in the NE ¼, NE ¼, SE1/4 of Section 34, Township 38 North, Range 17 West. According to the 7.5 minute Hahatonka topographic map, the 0.15-mile-long stream segment below this confluence appears to be perennial. Thus, the confluence of the unnamed tributary and the stream in Jarvis Hollow is considered the probable point of entry (PPE) to surface water. If the short stream segment is not perennially flowing, the PPE would then be located at the mouth of Jarvis hollow, where the stream enters the Lake of the Ozarks. Runoff from the Former Hulett Lagoon reaches the Lake of the Ozarks approximately 1.97 miles downstream of the site. Figure 1 illustrates drainage patterns and overland flow directions in the vicinity of the site.

The 1983 Green Bay Terrace 7.5-minute topographic map does not distinguish perennial from intermittent streams. All streams are shown as solid blue lines. However, the 1959 Green Bay Terrace map depicts the unnamed tributary that drains the site as intermittent.

Vandike noted that the unnamed tributary lost flow in some locations, especially when encountering the Gunter Sandstone. However, Vandike anticipated that any flow lost in

the streambed would stay in the valley. He noted that very little rainfall was necessary to generate surface flow throughout the reach of the stream. The receiving stream for the Former Hulett Lagoon Site has not been officially classified by DGLS, but based on available reports, the stream should be considered losing. The Gasconade Dolomite that forms much of the stream bed is not particularly karst. Many nearby streams have been classified as losing (Losing Stream File, 1999).

The 15-mile downstream limit (Figure 4) ends near Shepard Cove on the Osage River Arm of the Lake of the Ozarks, approximately 29.5 miles above Bagnell Dam. This point is located on the Camdenton, MO 7.5-minute quadrangle; SE ¼, Section 24, T. 39 N., R. 17 W. The Osage River flows in a north-easterly direction, toward the Missouri River.

SURFACE WATER TARGETS

Drinking Water Intakes

No known direct intake of stream water is located within 15 downstream miles of the PPE (Hahatonka, Green Bay Terrace, and Camdenton Quadrangles; DuCharme and Miller, 1996; and Inventory of Missouri Public Water Systems, 1997). The 15-mile surface water target distance limit is shown on Figure 4.

SOIL / AIR PATHWAY

Contaminated soils at the Former Hulett Lagoon were trucked off to the Camdenton Sludge Disposal Area in 1988. Potential downstream or downwind receptors are not likely to be affected by the Former Hulett Lagoon Site itself.

The native soil in the vicinity of the Former Hulett Lagoon site was the Clarksville-Gepp very cherty silt loam (Wolf, 1994). The Clarksville-Gepp soils are deep, well-drained soils typical of sloping uplands. Permeability is moderate. The content of organic material is moderately low. The shrink-swell potential is moderate. Grass at the site limits wind erosion.

The HRS Soil Group Designation from Table 4-4 is B (Federal Register, 1990).

REFERENCES

Anderson, K. H., et. al., Geologic Map of Missouri. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1979, 1 sheet.

Brown, James C., unpublished geologic map of the Hahatonka 7.5-Minute Quadrangle, SP-8426. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1984, 1 sheet.

Camdenton 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1983, 1 sheet.

Dames & Moore, Summary Report of Investigative and Remedial Activities Conducted to Achieve Closure of the Interim TSD Facility Modine Manufacturing Company Camdenton, Missouri, October 9, 1998, 33 pages and 17 figures.

Dames & Moore, Final Report of Fracture System Investigation, Modine Heat Transfer, Inc., Camdenton, Missouri, July 17, 1996, 13 pages and 11 figures.

Decaturville 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1975, 1 sheet.

DuCharme, C. B. and T. M. Miller, Missouri State Water Plan Series, Volume IV: Water Use of Missouri. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1996, 150 pages.

Federal Register, Volume 55, No. 241, Friday, December 14, 1990.

Gann, E. E., Water Resources of South-Central Missouri, Hydrologic Investigations Atlas HA-550. Department of the Interior, United States Geological Survey, 1976, 4 sheets.

Green Bay Terrace 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1983, 1 sheet.

Green Bay Terrace 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1959, photorevised 1982, 1 sheet.

Gregg, J. M., J. R. Palmer, and V. E. Kurtz, Field Guide to the Upper Cambrian of Southeastern Missouri: Stratigraphy, Sedimentology, and Economic Geology. Department of Geology and Geophysics, University of Missouri, Rolla MO 65401, 1989.

Guidance for Performing Preliminary Assessments Under CERCLA, EPA/540/G-91/013, Publication 9345.0-01A, September 1991.

Hahatonka 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1982, 1 sheet.

Harvey, E. J., John Skelton, and D. E. Miller, Hydrology of Carbonate Terrane – Niangua, Osage Fork, and Grandglaize Basins, Missouri, Water Resources Report 35, Missouri Department of Natural Resources, Division of Geology and Land Survey, 1983.

Imes, J. L., Major Geohydrologic Units in and Adjacent to the Ozark Plateaus Province, Missouri, Arkansas, Kansas, and Oklahoma, U.S. Geological Survey Hydrologic Investigations Atlas HA-711-A, scale 1:750,000, 1991, 1 sheet.

Imes, J. L., Major Geohydrologic Units in and Adjacent to the Ozark Plateaus Province, Missouri, Arkansas, Kansas, and Oklahoma - Ozark Aquifer, U.S. Geological Survey Hydrologic Investigations Atlas HA-711-E, scale 1:750,000, 1990, 3 sheets.

Inventory of Missouri Public Water Systems, 1997. Missouri Department of Natural Resources, 210 pages, 1997.

Krehbiel Engineering, Inc., Transmittal concerning the public-water-supply well on Hickory St., Camdenton, Missouri, (Including copies of pump test data and the pressure grout survey); addressed to James Vandike DNR-DGLS Water Resources Program, September 3, 1998.

Losing Stream File. Missouri Department of Natural Resources, Division of Geology and Land Survey, February, 1999.

McCracken, Mary H., Structural Features of Missouri, Report of Investigation Number 49. Missouri Geological Survey and Water Resources, 1971.

Missouri Water Atlas. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1986.

Missouri Water Resources Law - Annual Report, Water Resources Report Number 52. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1996, 30 pages.

Missouri Well Construction Rules, Private Water Wells, Heat Pump Systems, Pump Installations and Monitoring Wells, Authorizing Statutes – 256.600 to 256.640 RSMo, Missouri Department of Natural Resources, Division of Geology and Land Survey, 1996.

Missouri Wellhead Protection Program, Missouri Department of Natural Resources, Division of Environmental Quality, Public Drinking Water Program, December, 1994.

Palmer, J. R and Hayes, T. S., Maps Showing Locations of Known Mississippi Valley-Type Deposits and Occurrences in the Ozark Mountains Region Relative to Late

Cambrian Shaly Lithofacies and Other Shales, Missouri, Arkansas, Kansas, and Oklahoma. U.S. Geological Survey Miscellaneous Field Studies Map MF-1994-F, 1997.

Rainfall Frequency Atlas of the United States, Technical Paper Number 40. United States Department of Commerce, undated.

Soil Survey of Camden County, Missouri, United States Department of Agriculture Soil Conservation Service in cooperation with Missouri Agricultural Experiment Station, April 1989.

Thompson, Thomas L., Paleozoic Succession in Missouri- Part 2, Ordovician System, Report of Investigations Number 70. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1991.

Vandike, J. E., Missouri State Water Plan Series, Volume 1: Surface Water Resources of Missouri, Water Resources Report Number 45. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1995, 122 pages.

Vandike, J. E., A Hydrologic Analysis of the Ozark Aquifer in the Rolla Area, Missouri, Water Resources Report Number 41. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1992, 84 pages.

Vandike, J. E., Memorandum to Mimi Garstang, Chief, Waste Management Unit, DGLS; Subject: Hydrolocic investigation of the Sundstrand (Modine) site area, Camden County, MO; Missouri Department of Natural Resources, Division of Geology and Land Survey, March 18, 1992, 3 pages.

Water Resources Data, Missouri Water Year 1989, U.S. Geological Survey Water-Data Report MO-89-1. Department of the Interior, United States Geologic Survey, 1990, 354 pages.

Wedge, Keith, Structural Features of Missouri. Missouri Department of Natural Resources, Division of Geology and Land Survey, in preparation.

Well logs for the Camdenton area on file at DGLS, March, 1999.

Wolf, David W., Soil Survey of Camden County, Missouri. U.S. Department of Agriculture, Soil Conservation Service, 1994, 127 pages.

Table 1. Stratigraphic Column for Former Hulett Lagoon, Camden County (after Harvey et. al.,1983)

System	Aquifer Group	Approximate Site – Specific Thickness (ft)	Formation	Hydraulic Conductivity (cm/sec)	Regional Thickness (ft)	Dominant Lithology	Water-bearing Character
Quaternary		8	Colluvium and residuum		0-90	Regolith of residual clay, sand, chert pebbles and cobbles	May contain small amounts of perched water.
Ordovician	Ozark Aquifer	0?	Roubidoux Formation	10^{-3}	0-90	Clayey residuum, sandstone and sandy dolomite	Not present in sufficient thickness in the Camdenton area to produce usable quantities of water.
		300	Gasconade Dolomite	10^{-6}	300-385	Cherty dolomite, minor sandstone, and shale	Yields moderate to large quantities of water to wells. Yields range from 20 to 75 gpm. Less-permeable Upper Gasconade may act as a leaky confining unit.
		25	Gunter Sandstone Member	10^{-4}	10-45	Sandstone	Contributes moderate to large quantities of water. Most wells open to other formations.
Cambrian		500?	Eminence Dolomite	10^{-5}	240-600?	Cherty dolomite	Yields 6-100 gpm, the average being about 20 gpm
		150?	Potosi Dolomite	10^{-4}	30-330	Dolomite; contains abundant quartz druse	Yields large quantities of water to wells. Yields range from 100 to 750 gpm.
	St. Francois Confining Unit	180	Derby-Doerun Dolomite	10^{-7}	80?-215	Shaley dolomites and shale	Reliable aquitard.
		80	Davis Formation	10^{-7}	50-380?		
	St. Francois Aquifer	160	Bonneterre Formation	10^{-5}	85-200	Dolomite and limestone	Generally used only in outcrop areas. May contribute additional 100-200 gpm to wells open to other formations.
		240	Lamotte Sandstone	10^{-5}	140-300	Sandstone and arkosic conglomerate	
Precambrian	Basement Confining Unit					Igneous and metamorphic rocks	Does not yield water to wells in this area

able 2: Former Hulett Lagoon (PA/SI), Camden County, Missouri

Wells located 0 to 0.25 Miles from the Former Hulett Lagoon

Source	Well ID	Depth	CSG	Q1	Q2	Q3	SEC	TWN	RNG	Elev	SWL	Date	Use	Owner	Aquifer	PWSSIDEXT ID#	GPM
0 to 0.25 Miles																	
WIMS	0054495A	407	105		SE	SW	24	38N	17W	0	0	10/17/90	Private Well	PRICE	Ozark		0
0.25 to 0.5 Miles																	
PDWP	40376	900	400	SW	NE	NW	25	38N	17W		95	1986	Community	CITY OF CAMDENTON #6 - Mulberry	Ozark	3010130103	600
0.5 to 1 Mile																	
LOGMAIN	27877	1060	400	NE	NW	NE	25	38N	17W	1010	315	1974	Community	CITY OF CAMDENTON #4 - Blair	Ozark	3010130102	300
WIMS	0019268A	1100	463	SE	SE	SE	24	38N	17W	1024	260	11/16/98	Community	CITY OF CAMDENTON #7 - Hickory	Ozark		550
WIMS	0068392A	400	220	NE	SW	SE	23	38N	17W	230	220	11/13/91	Private Well		Ozark		30
WIMS	0084612A	420	100		SW	SE	23	38N	17W	0	210	4/27/92	Private Well	HULETT	Ozark		30
1 to 2 Miles																	
LOGMAIN	20180	1020	450	SE	SE	NE	25	38N	17W	1036	254	1961	Community	CITY OF CAMDENTON #3 - Rodeo	Ozark	3010130101	325
LOGMAIN	26540	600	403	NW	SE	SW	14	38N	17W	1006	165	1969	Nontransient	PROF NURSING HOME OF AM.	Ozark		140
LOGMAIN	28665	725	235				22	38N	17W	0		1987	Transient	MO.DEPT.CONSERVATION #2	Ozark		
PDWP	41987	0	0	0	0	0	0	0	0	0	0	0	Transient	Lake Dental Clinic	Ozark	3238244101	0
WIMS	0002076A	251	127			SE	04	30N	19W	0	90	8/14/87	Private Well	GALLAGHER, SR	Ozark		33
WIMS	0004240A	0	0				30	38N	16W	0	0	10/20/87	Private Well	DIAL	Ozark		0
WIMS	0005180A	282	84		NE	NW	22	38N	17W	0	120		Private Well	STINER	Ozark		20
WIMS	0005184A	175	170		SW	SE	22	38N	17W	0	15	9/25/87	Private Well	RAKEY	Ozark		40
WIMS	0006144A	0	0		NE	NE	27	38N	17W	0	0	5/16/88	Private Well	SULHAM	Ozark		0
WIMS	0014191A	725	235		NW	NE	22	38N	17W	1045	370	8/17/87	Private Well	CONSERVATION	Ozark		35
WIMS	0015210A	695	440		SE	SE	14	38N	17W	0	180	12/21/88	Private Well	WATKINS	Ozark		80
WIMS	0016656A	467	166		NW	NE	22	38N	17W	0	280	7/6/89	Private Well	WEBB	Ozark		20
WIMS	0034711A	260	105		NW	SE	27	38N	17W	689	20	6/7/90	Private Well	BOYCE	Ozark		25
WIMS	0034716A	240	105		NW	SE	27	38N	17W	669	8	5/29/90	Private Well	FIFIELD	Ozark		0
WIMS	0046879A	233	140		SW	NW	22	38N	17W	689	40	5/20/91	Private Well	DICKEMANN	Ozark		40
WIMS	0046891A	498	122		SW	NE	22	38N	17W	0	325	11/7/93	Private Well	MARR	Ozark		18
WIMS	0052628A	210	120		SE	SW	22	38N	17W	0	35	5/1/92	Private Well	SPICER	Ozark		30
WIMS	0052656A	210	100		NW	NE	34	38N	17W	0	35	8/15/92	Private Well	SALLS	Ozark		20

Wells located 1 to 2 Miles from the Former Hulett Lagoon

Source	Well ID	Depth	CSG	Q1	Q2	Q3	SEC	TWN	RNG	Elev	SWL	Date	Use	Owner	Aquifer	PWSSIDEXT ID#	GPM
WIMS	0054516A	407	168		NE	NW	13	38N	17W	0	220	10/25/90	Private Well		Ozark		40
WIMS	0059221A	215	106				27	38N	17W	690	22	12/6/90	Private Well	MONTGOMERY	Ozark		25
WIMS	0062723A	380	102		NE	SW	27	38N	17W	0	265	3/13/91	Private Well	MCKEVER	Ozark		30
WIMS	0066010A	260	121			SW	27	38N	17W	0	12	5/19/92	Private Well	BAILEY	Ozark		30
WIMS	0091425A	200	140	NE	SE	NW	27	38N	17W	698	18	8/26/93	Private Well	BRIGGS	Ozark		20
WIMS	0096827A	178	14	SW	NE	SW	27	38N	17W	0	23	12/16/93	Private Well		Ozark		15
WIMS	0096841A	340	220	NW	NE	NW	27	38N	17W	787	125	2/18/94	Private Well	BARE	Ozark		40
WIMS	0120553A	520	250	NW	SW	NE	22	38N	17W	0	350	9/14/94	Private Well	LEDBETTER	Ozark		25
WIMS	0120852A	235	174		NW	SE	22	38N	17W	0	80	6/27/94	Private Well	HOLLINGSWORTH	Ozark		25
WIMS	0120868A	293	110	NE	SE	SW	22	38N	17W	0	140	11/24/94	Private Well	ZEY	Ozark		25
WIMS	0173794A	220	143				27	38N	17W	0	30	10/31/92	Private Well	STONER	Ozark		35
WIMS	0186114A	320	142		NW	SE	27	38N	17W	0	20	9/25/97	Private Well	NEWILL	Ozark		65
WIMS	0190879A	230	160		NW	SE	27	38N	17W	0	20	5/22/97	Private Well	WOMACK	Ozark		0

2 to 3 Miles

Source	Well ID	Depth	CSG	Q1	Q2	Q3	SEC	TWN	RNG	Elev	SWL	Date	Use	Owner	Aquifer	PWSSIDEXT ID#	GPM
LOGMAIN	006568	70	41	NW	SE	SE	16	38N	17W	671		1940	Private Well	SCOTT, L C #1	Ozark		50
LOGMAIN	014093	570	250	SE	SE	NW	15	38N	17W	990	195	1955	Private Well	SCOTT, L.C. #2	Ozark		55
LOGMAIN	25162	550	250	SE	NW	SE	33	38N	17W	764	78	1967	Transient	LAKE VALLEY COUNTRY CLUB	Ozark		93
LOGMAIN	26629	505	350	S2	N2	NW	32	38N	16W	1021	250	1970	Nontransient	VIRGIL EADES TRAILER CT	Ozark	3048141101	100
LOGMAIN	28620	860	528				17	38N	16W	0	90	1983	Community	CITY OF LINN CREEK	Ozark	3010471102	225
LOGMAIN	5698	296	170	SE	NW	NW	17	38N	16W	696	15	1939	Community	CITY OF LINN CREEK	Ozark		40
PDWP	41487	0	0	0	0	0	0	0	0	0	0	0	Transient	Cedar Green Resort	Ozark	3010130103	0
PDWP	41580	350	80	0	0	0	0	0	0	0	63	1978	Transient	Adam's Ale Resort Inc	Ozark	3191518101	0
PDWP	41581	140	20	0	0	0	0	0	0	0	20	1973	Transient	Rippling Waters Resort	Ozark	3191747101	25
PDWP	41615	300	0	0	0	0	0	0	0	0	0	1984	Transient	Lake Valley Condos	Ozark	3210248101	0
PDWP	42571	300	0	0	0	0	0	0	0	0	0	1985	Transient	Lake Valley Condos	Ozark	3258251101	0
PDWP	42572	340	0	0	0	0	0	0	0	0	0	1986	Transient	Lake Valley Condos	Ozark	3238026102	0
PDWP	42573	340	0	0	0	0	0	0	0	0	0	1987	Transient	Lake Valley Condos	Ozark	3238026103	0
PDWP	42611	150	20	0	0	0	0	0	0	0	30	1982	Transient	Rippling Waters Resort	Ozark	3238026104	25
WIMS	0000624A	138	82				28	38N	17W	0	50	6/15/87	Private Well	RESORT	Ozark		25
WIMS	0001841A	380	305				32	38N	16W	0	225	7/30/87	Private Well	BOND	Ozark		30
WIMS	0002012A	260	84				28	38N	17W	0	90	8/25/87	Private Well	ULIUS	Ozark		20
WIMS	0002249A	420	147				31	38N	16W	0	215	8/25/87	Private Well	MOSIER	Ozark		30
WIMS	0004060A	400	105		SW	NE	31	38N	16W	0	200	10/5/87	Private Well	DAUGHERTY, SR.	Ozark		30
WIMS	0005182A	198	84		NE	NW	03	37N	17W	685	38		Private Well	SUTTON	Ozark		20
WIMS	0005246A	195	105		SW	NE	28	38N	17W	0	30	4/21/88	Private Well	BRANY	Ozark		30
WIMS	0005557A	300	126				17	38N	16W	0	200	4/22/88	Private Well	ENTERPRISES	Ozark		25
WIMS	0005948A	217	88		SW	NE	28	38N	17W	0	0		Private Well		Ozark		30
WIMS	0005951A	340	105		SW	NE	34	38N	17W	0	145	11/21/87	Private Well	SALLS	Ozark		30

Wells located 2 to 3 Miles from the Former Hulett Lagoon

Source	Well ID	Depth	CSG	Q1	Q2	Q3	SEC	TWN	RNG	Elev	SWL	Date	Use	Owner	Aquifer	PWSSIDEXT ID##	GPM
WIMS	0005999A	178	105		NW	NW	03	37N	17W	0	25	7/25/87	Private Well	WEBB	Ozark		20
WIMS	0006000A	218	147		NW	NW	03	37N	17W	0	60		Private Well	HANKS	Ozark		25
WIMS	0007295A	380	126		SE	SE	17	38N	16W	0	270	7/27/88	Private Well	WILLIAMS	Ozark		40
WIMS	0007296A	380	85		SW	NE	17	38N	16W	0	250	5/22/88	Private Well	KOWAL	Ozark		20
WIMS	0007306A	530	210		SE	NE	33	38N	17W	0	65	6/23/88	Private Well	LAKE VALLEY	Ozark		75
WIMS	0007320A	155	105		SW	NE	12	38N	17W	0	20	8/5/88	Private Well	WILBURN	Ozark		60
WIMS	0011103A	0	0	SE	NE	NW	03	37N	17W	0	12	6/24/88	Private Well	LUKOSIUS	Ozark		0
WIMS	0011741A	0	84		SW	NE	28	38N	17W	0	90	8/25/87	Private Well	ULIUS	Ozark		20
WIMS	0012040A	385	83		NE	SE	01	37N	17W	0	200	9/1/88	Private Well	JONES	Ozark		37
WIMS	0012651A	178	105		NE	NE	21	38N	17W	680	20	3/16/89	Private Well	STAUCH	Ozark		20
WIMS	0014203A	340	168				16	38N	17W	0	210	8/18/87	Private Well	THOMPSON	Ozark		35
WIMS	0015206A	343	103		NE	SW	32	38N	16W	0	140	6/15/89	Private Well	HICK	Ozark		25
WIMS	0015367A	170	108		SW	NE	28	38N	17W	0	0	2/15/89	Private Well	MORRIS	Ozark		30
WIMS	0026787A	343	105		NE	NE	28	38N	17W	0	60	11/14/89	Private Well	HEAD	Ozark		35
WIMS	0033740A	158	90		NW	NW	03	37N	17W	670	10	7/25/89	Private Well	SUTTON	Ozark		20
WIMS	0043289A	100	0		NE	NW	34	38N	17W	0	0		Private Well	LAMPERT	Ozark		0
WIMS	0044602A	380	139		SW	NW	32	38N	16W	0	205	6/18/89	Private Well	NEELEY	Ozark		25
WIMS	0044623A	200	126		NE	NE	21	38N	17W	690	43	10/27/89	Private Well	STAUCH	Ozark		20
WIMS	0044635A	220	126		NW	NW	03	37N	17W	670	62	11/24/89	Private Well	PERSELS	Ozark		30
WIMS	0047228A	235	140		NE	SW	21	38N	17W	0	45	8/16/90	Private Well	MCADAMS	Ozark		30
WIMS	0052590A	250	175	SW	SW	SW	21	38N	17W	0	60	11/11/90	Private Well	COLLINS	Ozark		55
WIMS	0052595A	151	80	NE	NW	SW	34	38N	17W	680	10	12/13/90	Private Well	FOSTER	Ozark		25
WIMS	0052626A	231	110	SW	SE	SW	34	38N	17W	710	65	9/3/93	Private Well	DICKMAN	Ozark		25
WIMS	0054310A	240	120		NW	SW	34	38N	17W	660	35	11/20/90	Private Well	ROWE	Ozark		30
WIMS	0054311A	220	119		NW	SW	34	38N	17W	720	30	10/19/90	Private Well	BALMER	Ozark		30
WIMS	0054493A	282	126		SE	SW	12	38N	17W	0	35	10/10/90	Private Well	THOMASON	Ozark		35
WIMS	0058354A	360	126		SE	NW	32	38N	16W	0	205	11/30/90	Private Well	SIMMONS	Ozark		20
WIMS	0062718A	200	100	NW	SE		20	38N	16W	0	12	3/9/91	Private Well	BARCLAY	Ozark		60
WIMS	0062770A	175	107	NE	NW	SW	27	38N	17W	689	22	7/19/91	Private Well	STOVER	Ozark		30
WIMS	0064171A	170	124		NW	SE	10	38N	17W	0	30	6/25/91	Private Well	OCAMPO	Ozark		30
WIMS	0064821A	475	153	SW	SE	SW	34	38N	17W	730	78	11/3/94	Private Well	LUTHER	Ozark		25
WIMS	0068405A	198	100	SW	NW	NE	03	37N	17W	680	15	10/14/91	Private Well	REAM	Ozark		20
WIMS	0077405A	375	80	NE	NE	NE	15	38N	17W	940	240	2/15/93	Private Well	BENBOW	Ozark		25
WIMS	0077412A	351	80		NE	SW	10	38N	17W	0	150	12/10/92	Private Well	ROBINSON	Ozark		25
WIMS	0077420A	370	80		SE	NE	20	38N	16W	0	195	11/1/92	Private Well	SHMIDT	Ozark		20
WIMS	0077771A	200	140	NW	SW	SE	34	38N	17W	660	23	9/17/92	Private Well	LOMBARDO	Ozark		25
WIMS	0088177A	210	82		NE	SW	28	38N	17W	0	90	5/13/92	Private Well	CYROS	Ozark		25
WIMS	0091365A	195	140	NW	NW	SW	27	38N	17W	689	42	5/22/93	Private Well	SWANSON	Ozark		30
WIMS	0120260A	180	120				21	38N	17W	0	15		Private Well	JACKSON	Ozark		20

Wells located 2 to 3 Miles from the Former Hulett Lagoon

Source	Well ID	Depth	CSG	Q1	Q2	Q3	SEC	TWN	RNG	Elev	SWL	Date	Use	Owner	Aquifer	PWSSIDEXT ID#	GPM
WIMS	0120860A	352	80	NE	SW	NW	32	38N	16W	0	170	9/15/94	Private Well	BURNS	Ozark		20
WIMS	0120864A	375	100	SE	NW	SE	17	38N	16W	0	270	10/2/94	Private Well	SHRAUGEN	Ozark		20
WIMS	0120872A	393	100		SW	NE	17	38N	16W	0	260	11/9/94	Private Well	BOOKE	Ozark		25
WIMS	0120872A	393	100		SW	NE	17	38N	16W	0	260	11/9/94	Private Well	BOOKE	Ozark		25
WIMS	0138061A	310	80		SW	NE	17	38N	16W	0	170	4/10/96	Private Well	WITTE	Ozark		20
WIMS	0158044A	340	102		SE	SW	34	38N	17W	0	140	8/22/96	Private Well	GOLDSTEN	Ozark		20
WIMS	0169782A	300	97				10	38N	17W	0	175	5/28/97	Private Well	EBERT	Ozark		30
WIMS	0182558A	340	100		NW	NW	03	37N	17W	0	120	6/30/97	Private Well	WILSMAN	Ozark		15

3 to 4 Miles

LOGMAIN	013462	275	66	NE	NE	SE	07	37N	16W	1065	225	1955	Private Well	CHANDLER, MOCK	Ozark		5
LOGMAIN	015981	365	0	SE	NE	SW	16	38N	16W	979		1956	Private Well	PARKINSON, JOHN	Ozark		30
LOGMAIN	018777	140	28	C	SW	NW	09	38N	16W	790	20	1959	Private Well	BOND, GUY O.	Ozark		20
LOGMAIN	27342	540	400	NW	SW	NE	17	38N	16W	800	150	1973	Nontransient	ST. MORITZ	Ozark		75
LOGMAIN	27691	925	430	SE	NW	NE	02	38N	17W	886	230	1974	Nontransient	CAMELOT ESTATES	Ozark		
LOGMAIN	28162	800	470	C	NW	SW	05	38N	16W	900			Nontransient	CAPE OF THE WOODS	Ozark		
PDWP	41567	300	150	0	0	0	0	0	0	0	20	1984	Transient	Clearwater Resort	Ozark	3190757101	30
PDWP	41610	0	0	0	0	0	0	0	0	0	0	0	Transient	54 & A Truck Stop & Restaurant	Ozark	3191748101	0
PDWP	41619	0	0	0	0	0	0	0	0	0	0	0	Transient	Windwood Condos	Ozark	3238026101	0
WIMS	0000178A	200	84				01	38N	17W	0	82	4/15/87	Private Well	GROHE	Ozark		15
WIMS	0000428A	300	84				01	38N	17W	0	166	4/30/87	Private Well	SHUMATO	Ozark		15
WIMS	0001307A	138	103				03	37N	17W	0	15	6/4/87	Private Well	TALLEY	Ozark		20
WIMS	0002013A	300	84				16	38N	16W	0	0	8/31/87	Private Well	HENSON	Ozark		20
WIMS	0002293A	196	103				29	38N	17W	0	30	7/23/87	Private Well	KEARNS	Ozark		30
WIMS	0002386A	238	84				16	38N	16W	0	30	9/18/87	Private Well	CONSTRUCTION	Ozark		30
WIMS	0002387A	238	0				16	38N	16W	0	0	9/18/87	Private Well	CONSTRUCTION	Ozark		0
WIMS	0004178A	363	105		NE	SW	03	38N	17W	0	100		Private Well	CLARK	Ozark		0
WIMS	0005142A	360	105				09	38N	17W	0	160	2/12/88	Private Well	COLEMAN	Ozark		35
WIMS	0005995A	176	105		SW	NE	06	38N	16W	0	15	8/10/87	Private Well	DONOHO	Ozark		30
WIMS	0006398A	0	0				21	38N	16W	0	0	5/9/88	Private Well	BAHNMILLER	Ozark		0
WIMS	0006809A	360	0		NE	SW	29	38N	17W	0	140	2/15/88	Private Well	COLEMAN	Ozark		0
WIMS	0006866A	0	0				16	38N	16W	0	0	6/3/88	Private Well	EBLING	Ozark		0
WIMS	0008263A	220	105				06	38N	16W	0	30	4/8/88	Private Well	LONG	Ozark		10
WIMS	0008591A	322	106				09	37N	17W	0	25	9/3/88	Private Well	COLLINS	Ozark		40
WIMS	0008592A	385	84				29	38N	17W	0	180	9/10/88	Private Well	DAILEY	Ozark		30
WIMS	0008719A	400	181		NW	SE	28	38N	16W	0	155	8/25/88	Private Well	TRUITT	Ozark		30
WIMS	0008724A	477	87		SW	SW	33	38N	17W	0	260	8/28/88	Private Well	COY	Ozark		22
WIMS	0009625A	240	110		SE	SE	20	38N	17W	0	30	10/18/88	Private Well	WARD	Ozark		18
WIMS	0009676A	180	126		SW	NE	03	38N	17W	0	30	8/9/88	Private Well	DERRINGER	Ozark		40

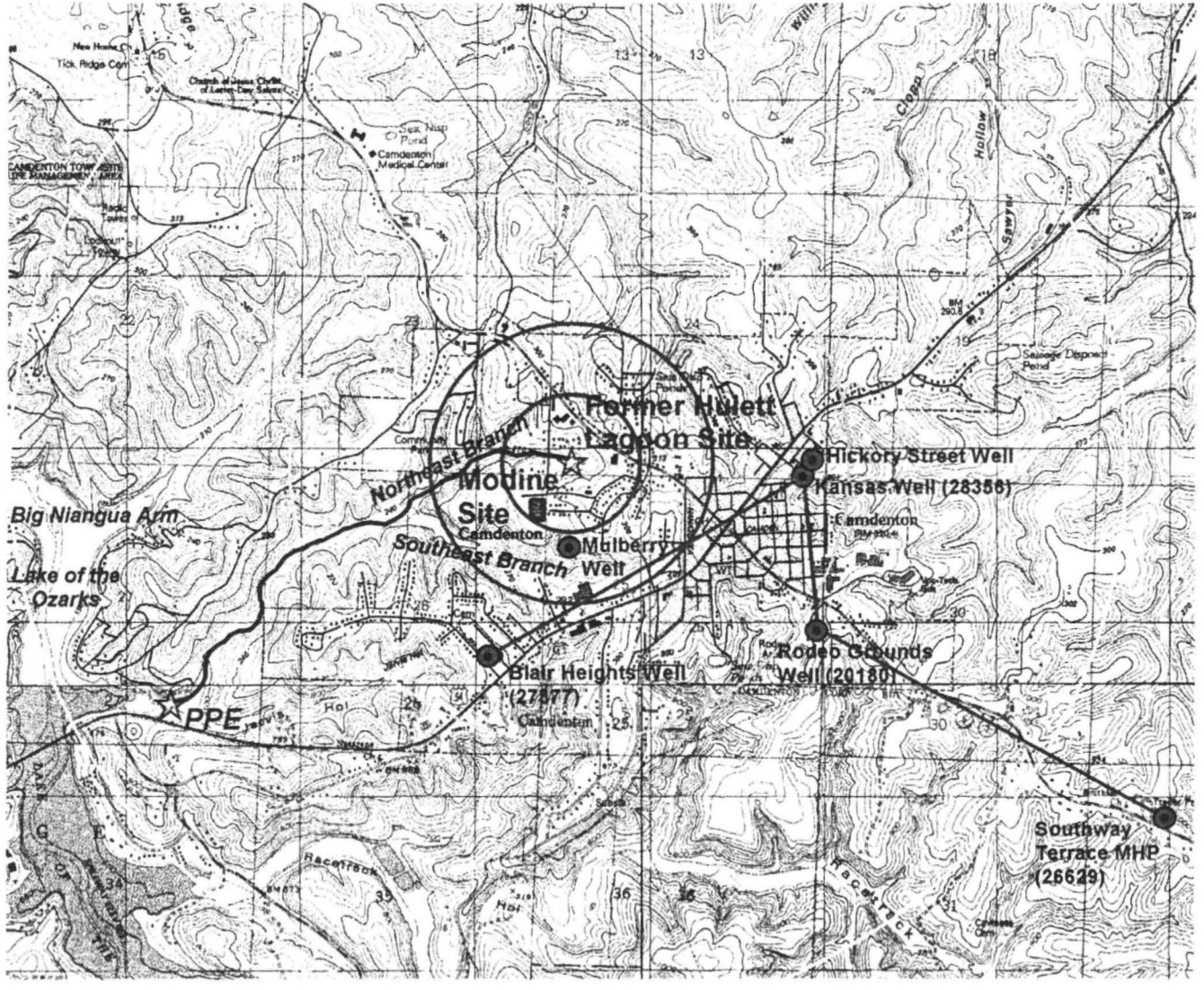
Wells located 3 to 4 Miles from the Former Hulett Lagoon

Source	Well ID	Depth	CSG	Q1	Q2	Q3	SEC	TWN	RNG	Elev	SWL	Date	Use	Owner	Aquifer	PWSSIDEXT ID##	GPM
WIMS	0011489A	400	106		SE	NW	28	38N	16W	0	160	10/16/88	Private Well	RAYBURN	Ozark		25
WIMS	0011697A	375	80		NE	SE	20	38N	17W	0	0	7/26/88	Private Well	SHARP	Ozark		18
WIMS	0012606A	219	84				03	38N	17W	0	0	5/1/88	Private Well	HASTINGS	Ozark		40
WIMS	0015212A	651	405		SW	SW	33	38N	16W	0	170	5/16/89	Private Well		Ozark		90
WIMS	0015364A	200	92		NE	NE	07	38N	16W	0	10	3/18/89	Private Well		Ozark		40
WIMS	0015368A	210	87		NW	NE	04	37N	17W	0	30	2/1/89	Private Well	MORRIS	Ozark		12
WIMS	0019739A	480	202		NE	NE	01	38N	17W	0	140	12/9/96	Private Well	FRETHOLM	Ozark		50
WIMS	0026793A	198	190		SE	NW	04	37N	17W	720	0	1/23/90	Private Well	COLLINS	Ozark		60
WIMS	0035888A	333	121		NE	SW	28	38N	16W	0	210	6/25/91	Private Well	ROYALS	Ozark		20
WIMS	0035889A	332	80		SE	NW	16	38N	17W	0	180	5/10/94	Private Well	STIDHAM	Ozark		18
WIMS	0035905A	297	86		SW	NE	16	38N	16W	0	115	2/20/90	Private Well	EVANS	Ozark		100
WIMS	0035914A	353	128		NE	SW	16	38N	16W	0	180	12/9/89	Private Well	MABREY	Ozark		50
WIMS	0043866A	400	103		SE	NW	16	38N	17W	0	207	5/8/90	Private Well	LUX	Ozark		20
WIMS	0046869A	353	106		NE	SW	33	38N	17W	0	245	12/26/90	Private Well	MORRIS	Ozark		15
WIMS	0046884A	190	80		NE	NW	16	38N	16W	0	45	7/8/93	Private Well	EVELAND	Ozark		12
WIMS	0046895A	377	119		NE	NE	05	37N	16W	0	205	10/1/93	Private Well	GEORGE	Ozark		25
WIMS	0052598A	312	100		NW	SW	21	38N	16W	0	155	9/13/92	Private Well	BARTLETT	Ozark		25
WIMS	0052601A	210	140		NW	SE	20	38N	17W	0	40	5/2/93	Private Well	MCGRATH	Ozark		50
WIMS	0052623A	248	84		NE	NE	17	38N	16W	0	35	7/15/92	Private Well	JACKSON	Ozark		30
WIMS	0052632A	210	120	SE	SW	SE	20	38N	17W	665	45	7/1/92	Private Well	WERNER	Ozark		30
WIMS	0052650A	291	80		NW	SW	33	38N	17W	0	140	8/18/92	Private Well	RODGERS	Ozark		25
WIMS	0054161A	340	106		NW	SW	21	38N	16W	0	166	7/23/90	Private Well	STRINE	Ozark		22
WIMS	0054164A	355	170	SW	SW	NE	16	38N	17W	905	207	8/3/90	Private Well	SHERRELL	Ozark		30
WIMS	0057058A	210	100		SE	NW	33	38N	17W	0	55	2/22/94	Private Well	BULLOCK	Ozark		30
WIMS	0062753A	200	100				06	38N	16W	0	50	6/3/91	Private Well	ALSBACH	Ozark		20
WIMS	0062774A	360	144		NW	NW	21	38N	16W	0	205	7/30/91	Private Well	WEST	Ozark		30
WIMS	0066002A	260	182		NE	NE	04	37N	17W	0	90	3/31/92	Private Well	ICENOGLE	Ozark		25
WIMS	0068399A	200	100	NW	NW	NW	28	38N	17W	669	18	10/21/91	Private Well		Ozark		20
WIMS	0068406A	220	120	SE	SW	NE	20	38N	17W	679	18	10/1/91	Private Well	WHITE	Ozark		8
WIMS	0077419A	360	80		SE	NW	21	38N	16W	0	210	12/16/92	Private Well	WEBB	Ozark		40
WIMS	0091289A	250	103		NW	NE	04	37N	17W	0	23	12/1/93	Private Well	GRECO	Ozark		20
WIMS	0091290A	170	103		NW	NE	04	37N	17W	0	0	12/2/93	Private Well	FRUEH	Ozark		30
WIMS	0091373A	480	105	SW	SE	NW	16	38N	17W	0	290	7/14/93	Private Well	ROBBINS	Ozark		20
WIMS	0096836A	240	160	SW	NW	NW	03	37N	17W	680	50	3/26/94	Private Well	OVERBY	Ozark		30
WIMS	0100968A	460	167	NE	NW	NE	08	37N	16W	0	196	3/18/94	Private Well	ADAMS	Ozark		15
WIMS	0108332A	280	100	SW	SW	SE	03	37N	17W	0	102	12/30/94	Private Well	MIELKE	Ozark		20
WIMS	0108341A	260	160	SW	SW	NW	21	38N	17W	722	30	2/13/95	Private Well	FEUSER	Ozark		18
WIMS	0120261A	320	82			SE	29	38N	17W	0	160	5/11/94	Private Well	TURRICK	Ozark		25
WIMS	0120853A	273	84	SW	SW	NE	03	38N	17W	0	127	7/29/94	Private Well	ROOFENER	Ozark		35

Wells located 3 to 4 Miles from the Former Hulett Lagoon

Source	Well ID	Depth	CSG	Q1	Q2	Q3	SEC	TWN	RNG	Elev	SWL	Date	Use	Owner	Aquifer	PWSSID EXT ID#	GPM
WIMS	0120873A	170	110	SW	NW	NE	29	38N	17W	0	25	8/15/94	Private Well	WERNER	Ozark		20
WIMS	0138031A	351	100	SW	SW	NW	21	38N	16W	0	155	9/1/95	Private Well	STAMPER	Ozark		25
WIMS	0138062A	333	108		NW	SE	28	38N	16W	0	0	12/4/95	Private Well	LOCK	Ozark		25
WIMS	0138068A	230	80		SE	NW	16	38N	16W	0	70	3/15/96	Private Well	HARGROVE	Ozark		35
WIMS	0138069A	371	105		NW	SW	21	38N	16W	0	170	3/20/96	Private Well	SAMULSON	Ozark		25
WIMS	0138081A	310	80		NW	SE	28	38N	16W	0	145	10/22/96	Private Well	STAMPER	Ozark		20
WIMS	0138085A	310	80		SW	NE	16	38N	16W	0	125	4/10/97	Private Well	WILLIAMS	Ozark		25
WIMS	0141774A	395	100	NE	SW	NE	21	38N	16W	0	210	7/6/95	Private Well	LAKE WOOD CONS	Ozark		40
WIMS	0148329A	415	100				28	38N	16W	0	150	6/28/96	Private Well	DEVIS	Ozark		50
WIMS	0148588A	320	104	NW	SE	NW	21	38N	16W	0	110	12/15/95	Private Well	LATHROP	Ozark		40
WIMS	0154616A	300	120	NW	SE	NE	17	38N	16W	0	158	8/19/96	Private Well	OSTER	Ozark		25
WIMS	0157304A	375	82			SW	16	38N	16W	0	233	7/15/96	Private Well	KIMMBLE	Ozark		32
WIMS	0157305A	355	82			SW	16	38N	16W	0	188	7/15/96	Private Well		Ozark		24
WIMS	0157532A	460	100			NW	11	37N	17W	0	240	10/8/96	Private Well	NOBLE	Ozark		20
WIMS	0157785A	150	120				20	38N	17W	670	7	11/23/96	Private Well	BELL	Ozark		30
WIMS	0173793A	430	142				07	37N	16W	0	260	6/30/96	Private Well	ROTHOVE	Ozark		50
WIMS	0181020A	360	82	NE	SE	NW	03	38N	17W	258	220	7/7/97	Private Well	BARE	Ozark		15
WIMS	0185537A	300	180				08	38N	17W	0	90	9/8/97	Private Well	WRIGHT	Ozark		30
WIMS	0190450A	415	100		NW	NE	08	38N	16W	0	200	9/30/97	Private Well	WILLIAMS	Ozark		30

Former Hulett Lagoon PA/SI
Camdenton, Missouri Camden County
Figure 1: Surface Water Pathway





Receiving Stream

Target Distance Limit (miles)

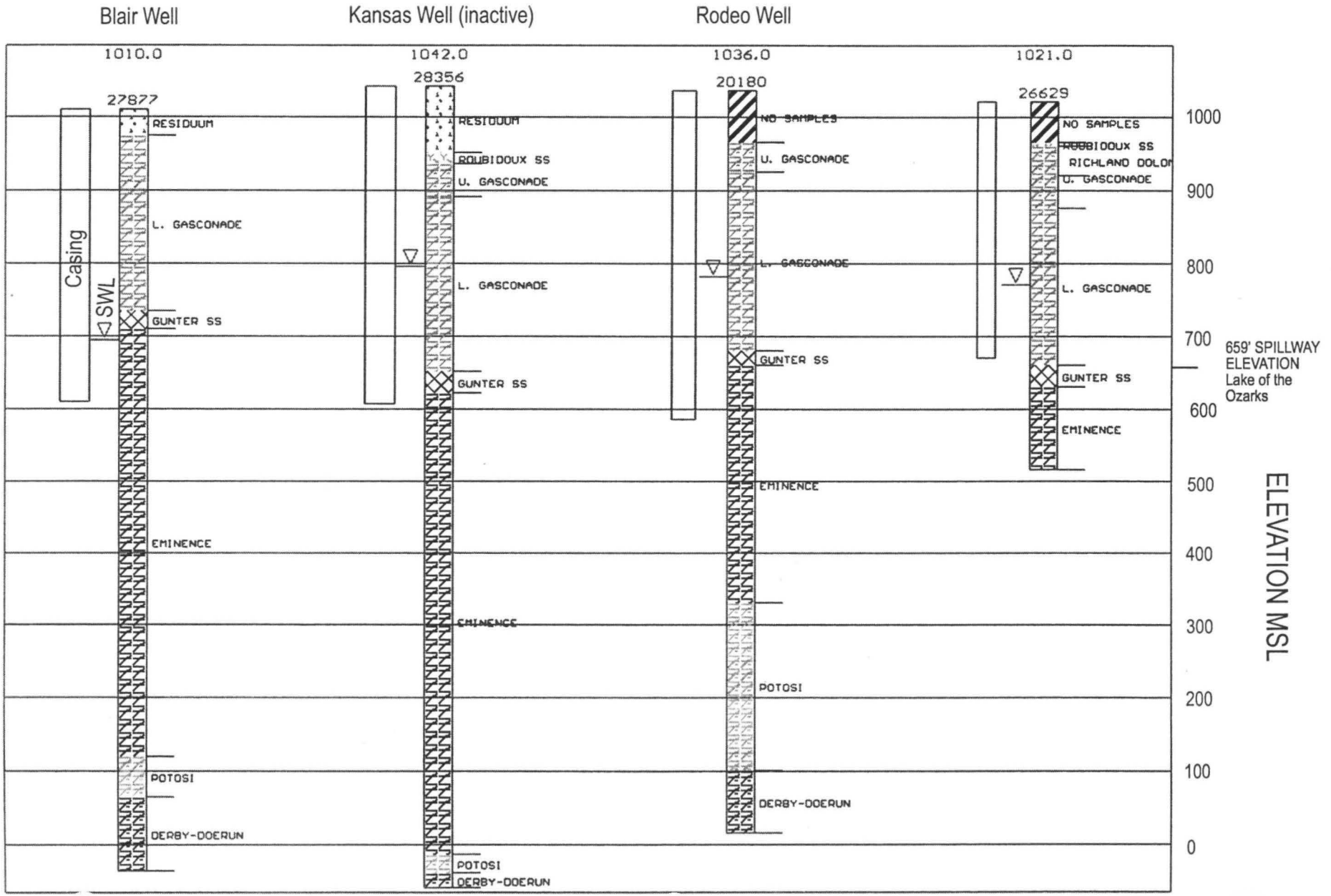
- 0.25
- 0.5
- 1
- 2

Select Community Well (LOGMAIN Number)

Cross-Section Location (See Figure 2)

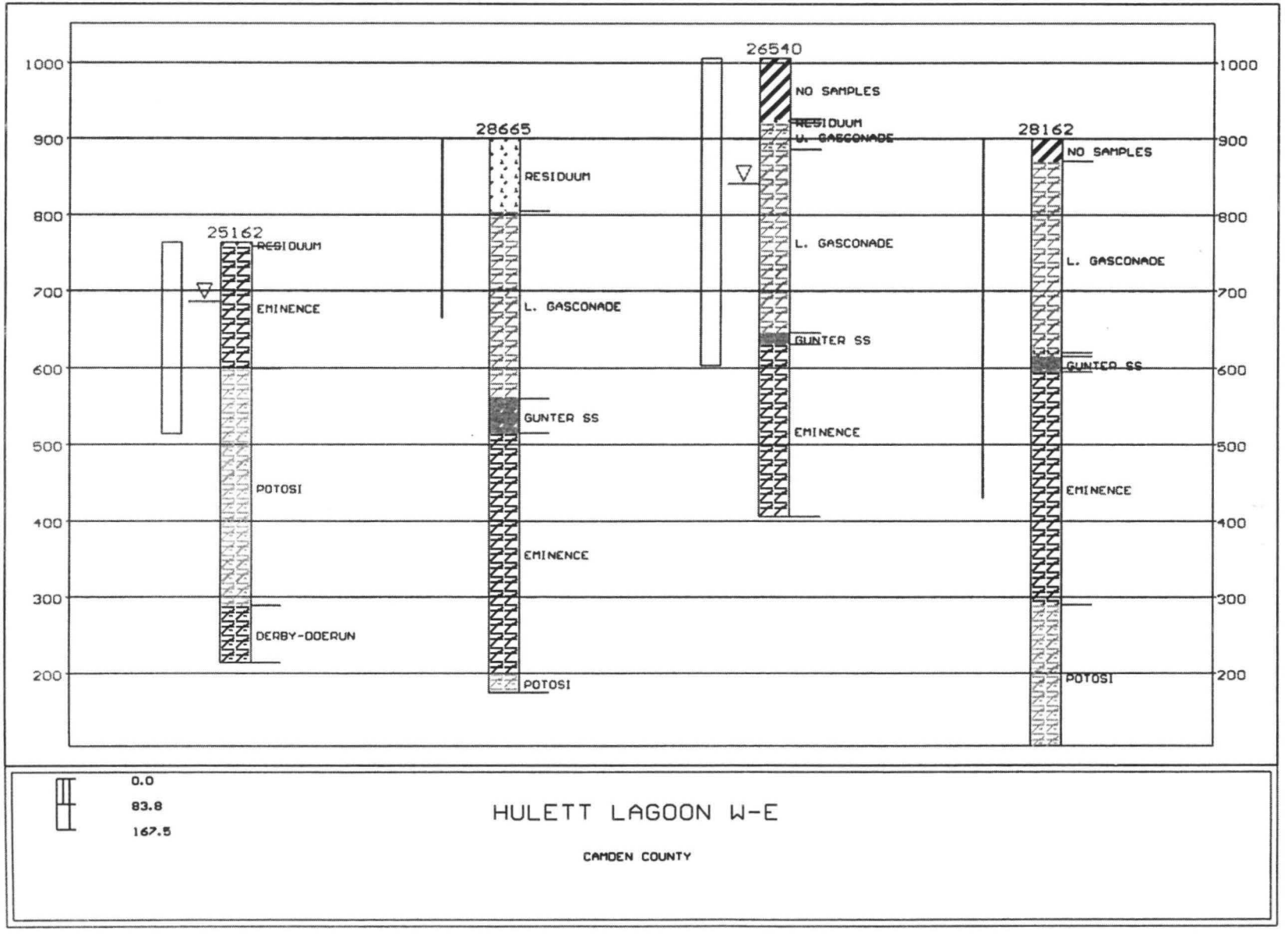
N
W E
S

Former Hulett Lagoon PA/SI, Camdenton Missouri
Figure 2: Cross-Section (see figure 1 for well locations)

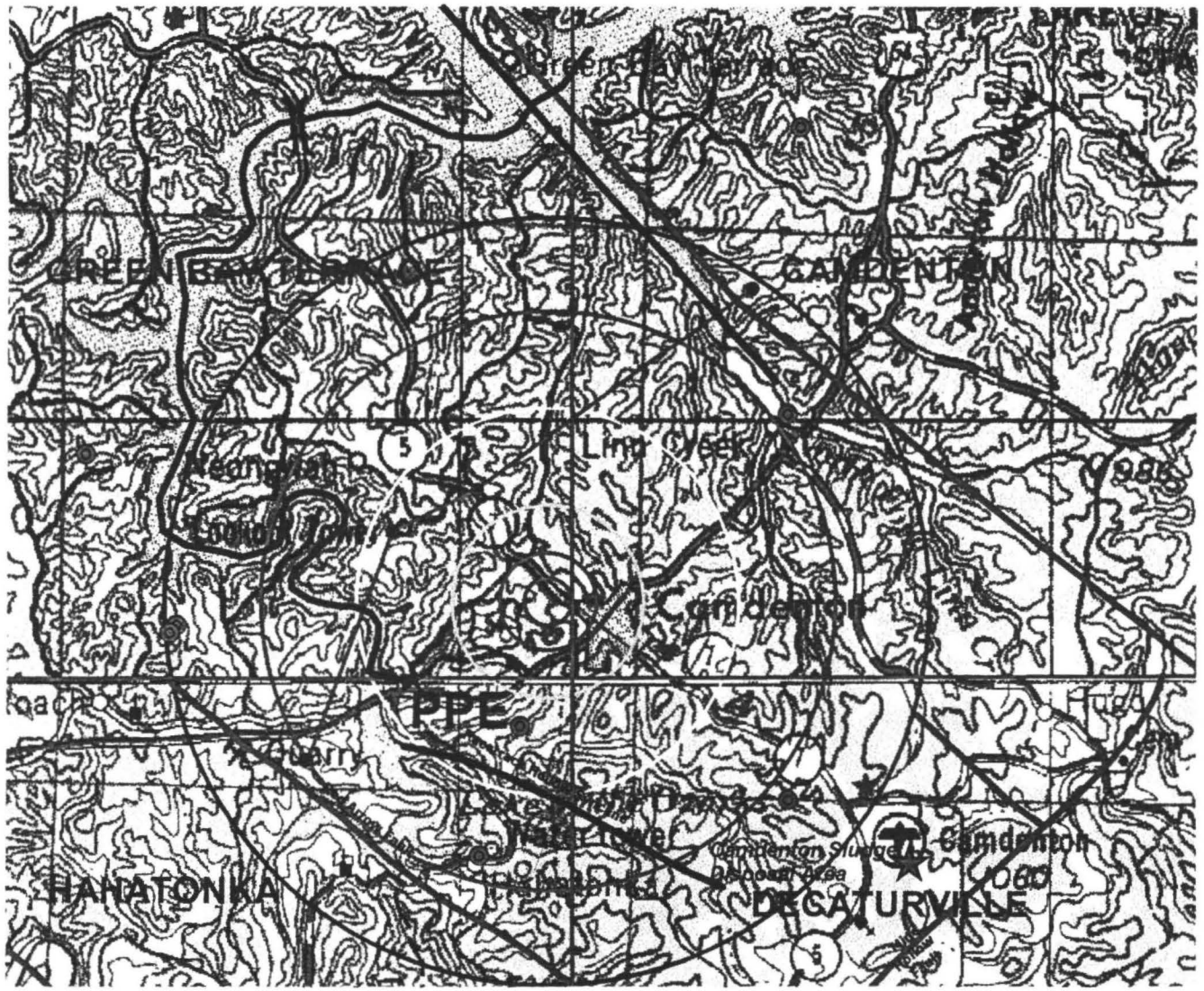


Former Hulett Lagoon PA/SI, Camdenton Missouri
Figure 3 (see figure 4 for well locations)

Southwest Northeast



Former Hulett Lagoon PA/SI
Camden County
Figure 4: 15-Mile Surface Water Target Distance Limit





15-Mile Surface Water Target Distance Limit

Spring

Regional Cross-Section with LOGMAIN Wells (see figure 3)

Fold

Fault

Target Distance Limit (Miles)

- 0.25
- 0.5
- 1
- 2
- 3
- 4

7.5 MINUTE QUADRANGLE NAME

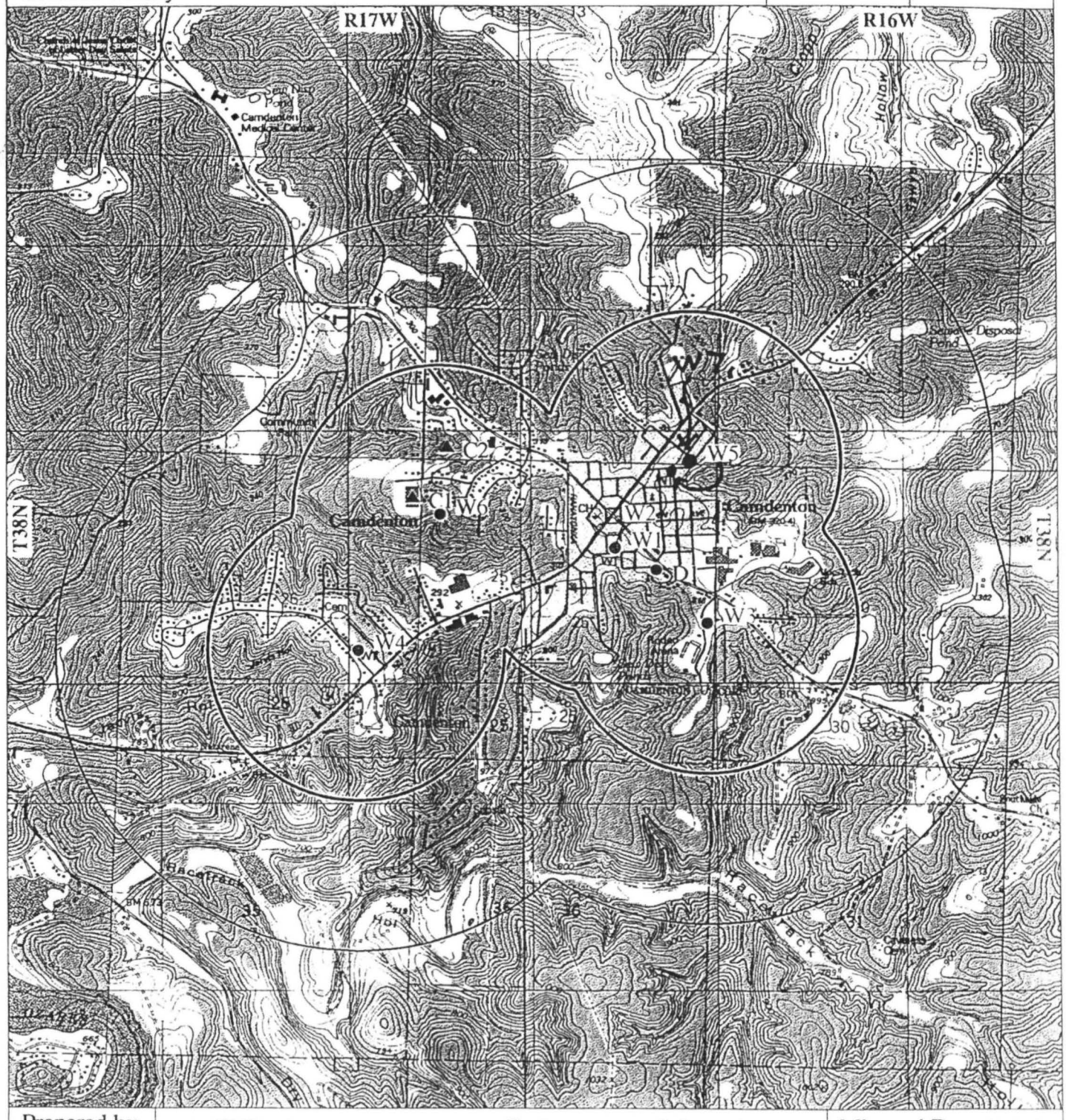
N
W E
S

Former Hulett Lagoon Site
Combined PA/SI
Reference 44

Camdenton
3010130
6 wells, 2 chemical sites, 1 dealership
Camden County

This map is st
to change as a
information is
Production Dat
November 05, 1998

2-24-99



Prepared by

CARES
University of Missouri – Columbia

- Wellhead
- Chemical Site
- Dealership
- Tank or WTP
- Half Mile Buffer
- One Mile Buffer
- Chemical Area Site
- Dealership Area Site

For base map symbols see the U.S. Geological Survey publication 'Topographic Map Symbols'

N

0 5000
feet

Missouri Department of Natural Resources

Division of Environmental Quality
Public Drinking Water Program

Camdenton
3010130
6 wells

*Temporary DGLS well number. The correct well number is requested.

The information below represents the data currently associated with the water supply layers. The well/intake number corresponds to the well/intake numbers depicted on the accompanying map Blanks indicate missing data. This table is subject to change as additional information is acquired
Source: Missouri Department of Natural Resources, Public Drinking Water Program.
Production Date: November 05, 1998

Well Number	W1	W2	W3	W4	W5
Extended PWS #	3010130101	3010130102	3010130103	3010130104	3010130105
Local Well Name	City Hall	City Hall	Rodeo Grounds	Blair Hgts.	Kansas
DGLS Well #	46039*	46040*	20180	27877	28356
Facility Type	City	City	City	City	City
Status	Abandoned	Abandoned	Active	Active	Inactive
Latitude	38 0 23.78 N	38 0 23.69 N	38 0 10.49 N	38 0 5.85 N	38 0 38.87 N
Longitude	92 44 39.29 W	92 44 39.41 W	92 44 18.82 W	92 45 36.61 W	92 44 22.34 W
USGS 7.5 Quadrangle	Camdenton	Camdenton	Camdenton	Green Bay Terrace	Camdenton
County	Camden	Camden	Camden	Camden	Camden
DNR Region	Jefferson City	Jefferson City	Jefferson City	Jefferson City	Jefferson City
Date Drilled (year)	1935	1940	1961	1974	1980
Material (C/U)	Consolidated	Consolidated	Consolidated	Consolidated	Consolidated
Yielding Strata	Potosi	Potosi	Potosi Dolomite	Potosi Dolomite	
Total Depth (feet)	794.0	800.0	940.0	1060.0	1100.0
Ground Elevation (ft)	1031.0	1031.0			
Top Seal	Yes			Satisfactory	Pressure Grout
Bottom Seal	Yes			Satisfactory	Pressure Grout
Casing Depth (feet)	80.0	75.0	450.0	400.0	435.0
Casing Size (inches)	12.0	6.0	8.0	10.0	10.0
Casing Type	Steel	Steel	Steel	Steel	Steel
Elev. of Casing Top (ft)					
Outer Casing Depth (ft)				46.0	20.0
Outer Casing Size (in)				16.0	16.0
Screen Length (feet)					
Screen Size (inches)					
Static Water Level (ft)	95.0	95.0	254.0	315.0	232.0
Well Yield (gpm)	100		380	100	
Head (feet)			50.0	100.0	
Draw Down (feet)			375.0	395.0	
Pump Test Date (year)			1984	1990	
Pump Type	Vertical Turbine	Vertical Turbine	Vertical Turbine	Vertical Turbine	
Pump Manufacturer	Worthington	Fairbanks Morse	Layne	Aurora	
Pump Depth (feet)			420	450	
Pump Capacity (gpm)	100	100	380	100	
Pump Meter (Y/N)		Y	Y	Y	
Standby Power (Y/N)			N	N	
VOC Detections (Y/N)			N	N	
Nitrate Detection (Y/N)			N	N	
Chlorination (Y/N)			N	N	
Filtration (Y/N)			N	N	
GWUDISW (Y/N)					
State Approved (Y/N)					
Surface Drainage	Satisfactory	Satisfactory		Satisfactory	
Date Abandoned (year)	1989	1989			
Date Plugged (year)					
Location Method	Map Interpolation	Map Interpolation			Map Interpolation
Method Accuracy (feet)	1300	1300			100

Camdenton
3010130
6 wells

*Temporary DGLS well number. The correct well number is requested.

The information below represents the data currently associated with the water supply layers. The well/intake number corresponds to the well/intake numbers depicted on the accompanying map Blanks indicate missing data. This table is subject to change as additional information is acquired Source: Missouri Department of Natural Resources, Public Drinking Water Program Production Date November 05, 1998 2-2

Well Number	W6	W7
Extended PWS #	3010130106	
Local Well Name	Mulberry Lane	Hickory
DGLS Well #	40376*	
Facility Type	City	
Status	Active	Active
Latitude	38 0 29.63 N	
Longitude	92 45 17.85 W	
USGS 7.5 Quadrangle	Green Bay Terrace	
County	Camden	
DNR Region	Jefferson City	
Date Drilled (year)	1986	1998
Material (C/U)	Consolidated	
Yielding Strata	Potosi Dolomite	
Total Depth (feet)	900.0	1100
Ground Elevation (ft)		
Top Seal	Pressure Grout	pressure grout
Bottom Seal	Pressure Grout	pressure grout
Casing Depth (feet)	400.0	450
Casing Size (inches)	12.0	8
Casing Type	Steel	steel
Elev. of Casing Top (ft)		
Outer Casing Depth (ft)	48.0	
Outer Casing Size (in)	16.0	
Screen Length (feet)		
Screen Size (inches)		
Static Water Level (ft)	95.0	
Well Yield (gpm)	600	
Head (feet)	85.0	135
Draw Down (feet)	265.0	
Pump Test Date (year)	1994	
Pump Type	Vertical Turbine	Submersible
Pump Manufacturer	Fairbanks Morse	
Pump Depth (feet)	350	500
Pump Capacity (gpm)	100	500
Pump Meter (Y/N)	Y	
Standby Power (Y/N)	N	
VOC Detections (Y/N)	Y	
Nitrate Detection (Y/N)	N	
Chlorination (Y/N)	N	
Filtration (Y/N)	N	
GWUDISW (Y/N)		
State Approved (Y/N)		
Surface Drainage	Satisfactory	
Date Abandoned (year)		
Date Plugged (year)		
Location Method		map interpolation
Method Accuracy (feet)		100

Camdenton
3010130
2 chemical sites

The information below represents the data currently associated with the water supply layers. The chemical site number corresponds to the chemical site numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is acquired.
Source Missouri Department of Natural Resources, Public Drinking Water Program.
Production Date: November 05, 1998

Chemical Site #	C1	C2
Site ID #	30035	30036
Latitude	38 0 32.69 N	38 0 41.53 N
Longitude	92 45 24.18 W	92 45 16.23 W
Name	Modine Heat Transfer, Inc.	Hulett Lagoon
Address		
City	Camdenton	Camdenton
ZIP Code		
Location Method	Map Interpolation	Map Interpolation
Method Accuracy (feet)	40	40
Chemical, Db	Trichloroethylene (TCE), Db 999 Cyanides, Db 999 Multiple Metals, Db 999 Multiple VOCs, Db 999	Cyanides, Db 999 Multiple Metals, Db 999 Multiple VOCs, Db 999

Camdenton
3010130
1 dealership

The information below represents the data currently associated with the water supply layers. The dealership number corresponds to the dealership numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is acquired.
Source Missouri Department of Natural Resources, Public Drinking Water Program.
Production Date: November 05, 1998

Dealership #	D1
Site ID #	20187
Latitude	38 0 19.8 N
Longitude	92 44 30.2 W
Name	Camdenton Farm & Garden
Address	Hwy 5 S
City	Camdenton
ZIP Code	65020
Database #	48
Location Method	
Method Accuracy (feet)	
Active	No

SUPPLY CAMPENTON

WELL DATA:

	Well No. 1 (Abandoned)	Well No. 2 (Abandoned)	Well No. 3	Well No. 4	Well No. 5 (Not Pumping)	Well No. 6
Date Drilled	1931	1931	1961	1974	1980	1986
Local Designation	CITY HALL	CITY HALL	Rodeo Grounds	Blair Hgts	Kansas St	Mulberry
Type	DRILLED	DRILLED	DRILLED	Drilled	Drilled	Drilled
Total Depth	800'	794'	940'	1045'	1100 <1000'	900'
Depth and Size of Casing	79'-6"	80'-8"	450'-8"	400' of 10"	435' of 10"	400' of 12"
Casing Material	STEEL	STEEL	STEEL	Steel	Steel	Steel
Size Hole Below Casing Point	6"	8"	8"	10"	10"	12"
Static Water Level	95'	95'	254'	315'		
Draw Down and Yield	-170GPM	-170GPM	-325GPM	(new) 2.6 gpm/ft.		
Water-Bearing Strata	POTOSI	POTOSI	ROUBIDOUX			
Top Seal (Method)	SPLIT RING SAN WELL SEAL	SPLIT RING SAN. WELL SEAL	PUMP MOTOR BASE	Pump Motor Base		
Bottom Seal		PRESSURE GROUT	PRESSURE GROUT 8/25/61	10-24-74 Press. Grout	3-19-80 Pres. Grout	6-24-86 Pres Grout
Pump Type	SUBMERSIBLE	SUBMERSIBLE	VERT. TURBINE water lub	Vert. Turbine		Vert. Turb water lube
Manufacturer	REDA	REDA	LAYNE	Aurora		Fairbanks Morse
Capacity	170+ GPM	170+ GPM	~~400~~ 320 GPM	300 gpm		575 100 HP
Pump Setting	350'	400'	420'			
Meter	YES	YES	YES	Yes		YES
Size and Length of Screen	———	———	———	———		
Type of Standby Power						
Surface Drainage	OK	O.K.	O.K.	OK.		
Date Abandoned	No Pump 9/87	No Pump 9/87			No Pump 9/87	
Date Plugged						

ELEVATION

LOCATION

Former Hulett Lagoon Site
Combined PA/SI
Reference 45

FEBRUARY 24, 1999

VALERIE H. WILDER
DEPARTMENT OF NATURAL RESOURCES
P.O. BOX 176
JEFFERSON CITY MO 65102-0176

DEAR VALERIE:

THE MULBERRY WELL WAS TAKEN OFF LINE ON FEBRUARY 2, 1999 IN THE CITY OF CAMDENTON I HAVE PUMPED THE MULBERRY WELL TO WASTE ON THE 22, 26 AND 29 OF JANUARY 1999 FOR A TOTAL OF 5 HRS

ON FEBRUARY 2, 1999 BLAIR WELL HAD ELECTRICAL PROBLEMS AND I HAD TO PUT MULBERRY BACK ON LINE, I SHUT MULBERRY OFF FEBRUARY 9, 1999 AND TOOK MULBERRY WELL OFF LINE. I PUMPED A TOTAL OF 400,000 GALS IN THAT TIME.

I DID NOT PUMP MULBERRY WELL AGAIN UNTIL FEBRUARY 12, 1999. WHEN I HAD TO PUT THE WELL BACK ON LINE WHEN WE HAD

(2)

PROBLEMS WITH OUR WATER CONTROLS AND REPAIRS WERE MADE BY R. E. PEDROTTI CO. I USED THE WELL FOR FOUR DAYS AND PUMPED 1,314 GALS INTO THE SYSTEM. MULBERRY WAS TAKEN OUT OF LINE ON FEBRUARY 16, 1999. I HAVE NOT PUMPED MULBERRY INTO THE SYSTEM TO DATE.

I HAVE PUMPED MULBERRY TO WASTE ON FEBRUARY 23, 1999 FOR ONE HOUR. AND HAVE NOT PUMPED THE WELL SENSE

IF YOU HAVE ANY QUESTIONS CONCERNING MULBERRY WELL PUMPAGE OR OTHER QUESTIONS PLEASE CONTACT ME AT (573) 346-7293

SINCERELY,

VINCENT COSTA
DIRECTOR PUBLIC WORKS

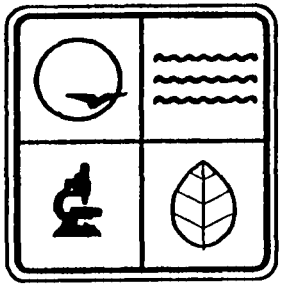
VALERIE

MULBERRY PUMPS 570 TO 600 G.P.M
MULBERRY WAS OUR LEAD WELL UNTIL
JULY OF 1998. WHEN WE HAD OUR NEW
CONTROLS PUT IN THIS JULY WE WERE
ABLE TO SET OUR WELLS AS TOO THE
TIME THEY WERE TO COME ON. I
PUT MULBERRY AS THE THIRD WELL.
WHEN WE HAD OUR OLD CONTROLS
MULBERRY ALWAYS WAS THE FIRST
WELL TO RUN. BLAIR WELL & RODEO
WELL RAN WHEN MULBERRY WAS NOT
ABLE TO HANDLE THE DEMAND. WE
AVERAGE ABOUT 600,000 PER DAY.
MULBERRY WITH THE OLD CONTROLS
PUMPED ABOUT 70 % ~~OF~~ THE WATER

WITH THE NEW CONTROLS I WAS ABLE
TO CUT MULBERRY DOWN TO ABOUT
40 % OF THE WATER USAGE.

I HOPE THAT THIS WILL HELP YOU

INVENTORY OF MISSOURI PUBLIC WATER SYSTEMS 1998



RECEIVED
MAR 0 5 1999
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Missouri Department of Natural Resources
Division of Environmental Quality

Former Hulett Lagoon Site
Combined PA/SI
Reference 46

TABLE OF CONTENTS

I. KEY INFORMATION

Key to Codes and Abbreviations 1
DNR-DEQ Regional Office Map 3
Counties by DNR-DEQ Region 4

II. STATISTICAL INVENTORY INFORMATION

Number of Regulated Systems by DNR-DEQ Region 5
Community Water System Populations by Source Type 6

III. COMMUNITY WATER SYSTEM INVENTORY INFORMATION

City Water Systems 7
District Water Systems 57
Subdivision, Mobile Home Park, Institution and Miscellaneous Water Systems 80
Water Systems that Sell Water to Other Water Systems 133
Water Systems that Buy Water from Other Water Systems 141

IV. NON-COMMUNITY WATER SYSTEM INVENTORY INFORMATION

Non-Community Water Systems 149

V. FLUORIDATED WATER SYSTEM INFORMATION

Water Systems Containing Amounts of Natural Fluoride 193
Water Systems with Adjusted Fluoride 196

VI. SURFACE WATER SOURCE INFORMATION

Map of Surface Water System Locations 200
Public Water Supply Lake Dam Locations 201
Public Water System Intake Locations 208

CITY WATER SYSTEMS

COMMUNITY WATER SYSTEM NAME		YEAR BEGAN	OPER LVL	OWN	POP SERV	SERV CON	PCT SUR	PCT GRD	PCT PUR SUR	PCT PUR GRD	SUPPLY CAPACITY M.G.D.	AVG DLY CONSUMP M.G.D.	FINISHED WATER STORAGE
CALIFORNIA		1992	D	4	3,400	1,711	0	100	0	0	2.8000	1.1100	0.2250
ID NUMBER MO3010124	COUNTY LOCATION MONITEAU												
CALLAO		1960	E	4	332	179	0	0	100	0	0.0432	0.0240	0.0500
ID NUMBER MO2010125	COUNTY LOCATION MACON												
CAMDENTON		1931	E	4	3,010	1,260	0	100	0	0	1.2000	0.5000	0.4250
ID NUMBER MO3010130	COUNTY LOCATION CAMDEN												
CAMERON		1919	B	4	8,300	1,900	100	0	0	0	3.1680	1.1500	1.9600
ID NUMBER MO1010131	COUNTY LOCATION CLINTON												
CAMPBELL		1911	E	4	2,350	1,216	0	100	0	0	1.1520	0.3260	0.3500
ID NUMBER MO4010132	COUNTY LOCATION DUNKLIN												
CANTON		1937	B	4	2,623	860	0	100	0	0	0.7200	0.2091	0.3630
ID NUMBER MO2010134	COUNTY LOCATION LEWIS												
CAPE GIRARDEAU		1931	A	4	39,500	13,236	76	24	0	0	4.7400	3.6000	5.2550
ID NUMBER MO4010136	COUNTY LOCATION CAPE GIRARDEAU												
CARDWELL		1951	E	4	792	398	0	100	0	0	0.4320	0.1210	0.0750
ID NUMBER MO4010137	COUNTY LOCATION DUNKLIN												
CARL JUNCTION		1910	D	4	3,875	1,550	0	100	0	0	1.8640	0.3500	0.3000
ID NUMBER MO5010138	COUNTY LOCATION JASPER												
CARROLLTON		1941	A	4	4,406	2,117	0	100	0	0	2.4000	0.6750	0.8400
ID NUMBER MO2010140	COUNTY LOCATION CARROLL												
CARTERVILLE		1910	E	4	1,972	754	0	100	0	0	0.0000	0.1260	0.0000
ID NUMBER MO5010141	COUNTY LOCATION JASPER												
CARTHAGE		1909	B	4	10,747	4,700	0	100	0	0	4.0000	2.8000	2.3900
ID NUMBER MO5010142	COUNTY LOCATION JASPER												

CITY WATER SYSTEMS

COMMUNITY WATER SYSTEM NAME		YEAR BEGAN	OPER LVL	OWN	POP SERV	SERV CON	PCT SUR	PCT GRD	PCT PUR SUR	PCT PUR GRD	SUPPLY CAPACITY M.G.D.	AVG DLY CONSUMP M.G.D.	FINISHED WATER STORAGE
LEWISTOWN		1966	C	4	502	294	100	0	0	0	0.1580	0.0502	0.0711
ID NUMBER MO2010463	COUNTY LOCATION LEWIS												
LEXINGTON		1884	B	2	5,200	2,278	100	0	0	0	1.2000	0.4640	0.2500
ID NUMBER MO1010464	COUNTY LOCATION LAFAYETTE												
LIBERAL		1937	D	4	867	347	0	100	0	0	0.6980	0.0700	0.0550
ID NUMBER MO5010465	COUNTY LOCATION BARTON												
LIBERTY		1962	A	4	28,000	7,800	0	100	0	0	9.0000	2.8500	5.0000
ID NUMBER MO1010466	COUNTY LOCATION CLAY												
LICKING		1988	E	4	1,328	630	0	100	0	0	0.5330	0.1676	0.2500
ID NUMBER MO4010467	COUNTY LOCATION TEXAS												
LILBOURN		1946	D	4	1,500	600	0	100	0	0	0.6690	0.1685	0.1000
ID NUMBER MO4010468	COUNTY LOCATION NEW MADRID												
LINCOLN		1950	D	4	860	450	0	100	0	0	0.5400	0.0900	0.0500
ID NUMBER MO3010469	COUNTY LOCATION BENTON												
LINN		1937	E	4	1,220	605	0	100	0	0	0.9300	0.1250	0.3000
ID NUMBER MO3010470	COUNTY LOCATION OSAGE												
LINN CREEK		1939	E	4	260	80	0	100	0	0	0.0700	0.0350	0.0300
ID NUMBER MO3010471	COUNTY LOCATION CAMDEN												
LINNEUS		1957	C	4	529	222	100	0	0	0	0.2160	0.0440	0.0640
ID NUMBER MO2010472	COUNTY LOCATION LINN												
LOCKWOOD		1928	D	4	1,450	580	0	100	0	0	1.0800	0.1900	0.3500
ID NUMBER MO5010475	COUNTY LOCATION DADE												
LOUISBURG		1991	D	4	157	63	0	100	0	0	0.4240	0.0150	0.0100
ID NUMBER MO5011068	COUNTY LOCATION DALLAS												

SUBDIVISION, MOBILE HOME PARK, INSTITUTION, MISCELLANEOUS WATER SYSTEMS

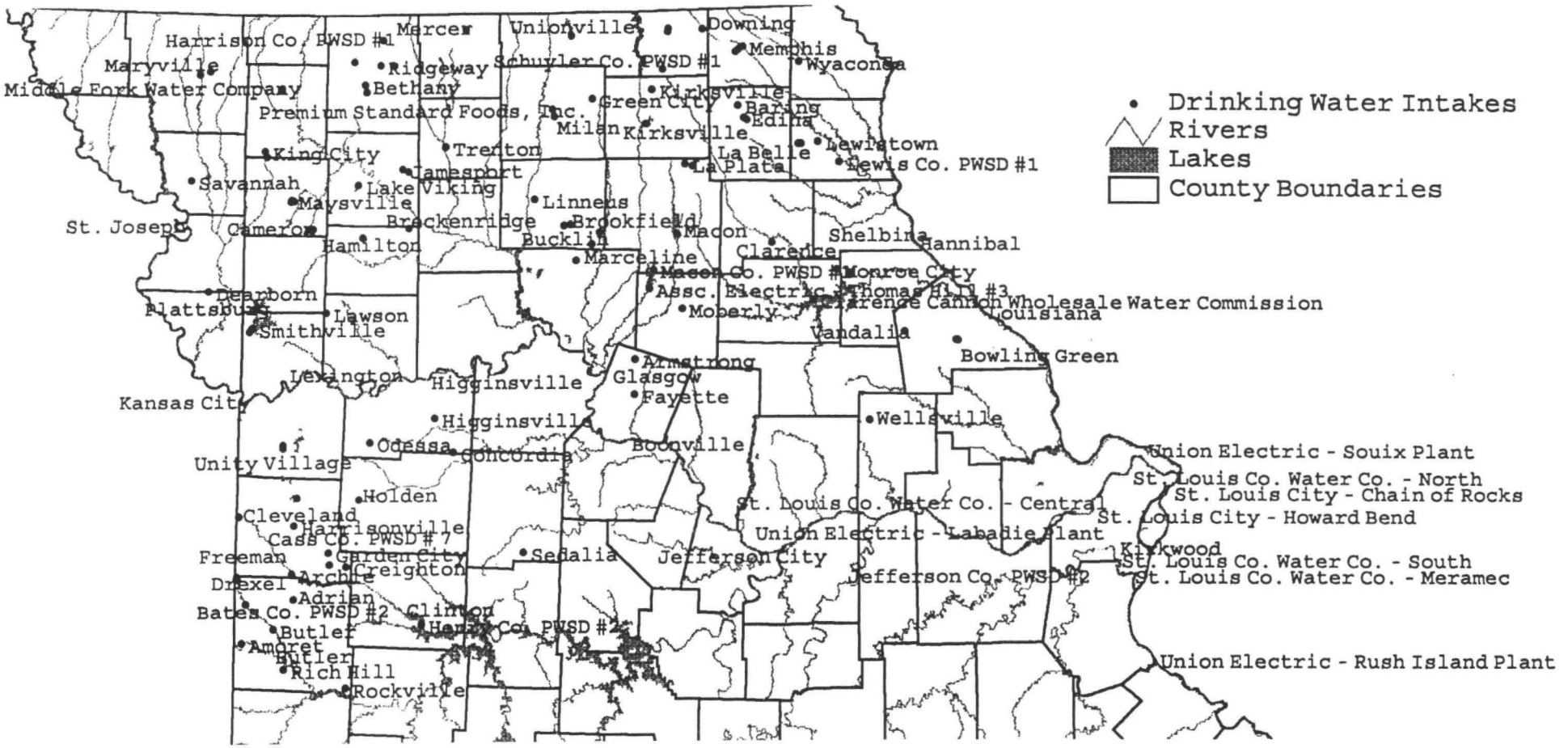
COMMUNITY WATER SYSTEM NAME	YEAR BEGAN	OPER LVL	OWN	POP SERV	SERV CON	PCT SUR	PCT GRD	PCT PUR SUR	PCT PUR GRD	SUPPLY CAPACITY M.G.D.	AVG DLY CONSUMP M.G.D.	FINISHED WATER STORAGE
SOUTHERN HILLS ESTATES SUBD	1989	D	2	59	16	0	100	0	0	0.1970	0.0044	0.0005
ID NUMBER MO5036259 — COUNTY LOCATION NEWTON												
SOUTHERN HILLS WATER CO	1986	D	2	190	52	0	100	0	0	0.0700	0.0160	0.0020
ID NUMBER MO3036065 — COUNTY LOCATION PETTIS												
SOUTHFORK MHP	1991	C	2	800	480	0	0	100	0	0.0000	0.0000	0.0000
ID NUMBER MO1048442 — COUNTY LOCATION CASS												
SOUTHGATE SUBDIVISION	1992	X	2	200	63	0	100	0	0	0.0600	0.0200	0.0080
ID NUMBER MO3036179 — COUNTY LOCATION PETTIS												
SOUTHSIDE MHP LLC	1987	E	2	80	35	0	100	0	0	0.1250	0.0080	0.0002
ID NUMBER MO3048015 — COUNTY LOCATION BOONE												
SOUTHWAY TERRACE MHP	1970	X	2	85	35	0	100	0	0	0.0000	0.0070	0.0020
ID NUMBER MO3048141 — COUNTY LOCATION CAMDEN												
SOUTHWOOD ACRES SUBD	1967	X	2	75	20	0	100	0	0	0.0450	0.0070	0.0640
ID NUMBER MO3036066 — COUNTY LOCATION PETTIS												
SPARTA MHP	1971	X	2	75	30	0	100	0	0	0.0432	0.0050	0.0004
ID NUMBER MO5048154 — COUNTY LOCATION CHRISTIAN												
SPOKANE HIGHLANDS	1994	E	2	25	1	0	100	0	0	0.0000	0.0000	0.0000
ID NUMBER MO5031093 — COUNTY LOCATION CHRISTIAN												
SPRING CREEK 2ND ADD	1992	D	2	35	15	0	100	0	0	0.0000	0.0000	0.0004
ID NUMBER MO5030391 — COUNTY LOCATION TANEY												
SPRING CREEK ADDITION MHP	1983	X	2	62	25	0	100	0	0	0.0000	0.0030	0.0006
ID NUMBER MO5048221 — COUNTY LOCATION TANEY												

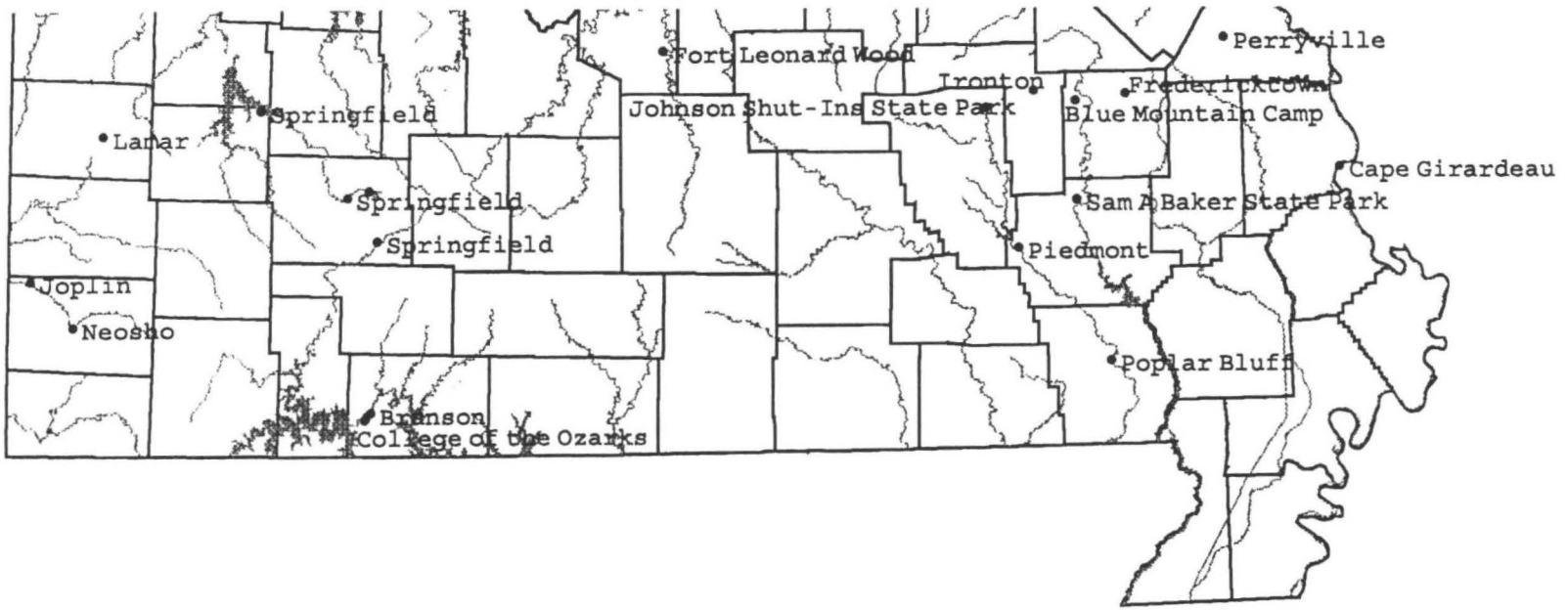
SUBDIVISION, MOBILE HOME PARK, INSTITUTION, MISCELLANEOUS WATER SYSTEMS

COMMUNITY WATER SYSTEM NAME	YEAR BEGAN	OPER LVL	OWN	POP SERV	SERV CON	PCT SUR	PCT GRD	PCT PUR SUR	PCT PUR GRD	SUPPLY CAPACITY M.G.D.	AVG DLY CONSUMP M.G.D.	FINISHED WATER STORAGE
WHITSON SCENIC VIEW MHP ID NUMBER MO3048132 COUNTY LOCATION PHELPS	1965	X	2	90	45	0	100	0	0	0.0200	0.0100	0.0005
WILD OAKS WATER COMPANY ID NUMBER MO4036310 COUNTY LOCATION WAYNE	1976	D	2	42	14	0	100	0	0	0.0000	0.0080	0.0001
WILDEN HEIGHTS SUBD ID NUMBER MO5036192 COUNTY LOCATION GREENE	1992	X	2	52	21	0	100	0	0	0.0580	0.0040	0.0010
WILDERNESS CLUB INC ID NUMBER MO5031102 COUNTY LOCATION TANEY	1995	E	2	100	70	0	100	0	0	0.1296	0.0000	0.0300
WINDSOR BAY ID NUMBER MO5036168 COUNTY LOCATION BARRY	1989	X	2	35	137	0	100	0	0	0.1080	0.0010	0.0110
WINDSOR ESTATES NURSING HOME ID NUMBER MO3069006 COUNTY LOCATION CAMDEN	1969	X	2	70	1	0	100	0	0	0.0000	0.0090	0.0012
WINDWOOD ESTATES SUBD ID NUMBER MO4031196 COUNTY LOCATION CAPE GIRARDEAU	1997	D	2	45	16	0	100	0	0	0.0000	0.0000	0.0000
WINEGARS TEAL BEND SUBD ID NUMBER MO3036121 COUNTY LOCATION BENTON	1950	X	2	400	140	0	100	0	0	0.1700	0.0150	0.0140
WINTERHAVEN MOBILE HOME ESTATE ID NUMBER MO5048077 COUNTY LOCATION NEWTON	1990	E	2	120	48	0	100	0	0	0.0000	0.0080	0.0002
WOOD RIDGE ESTATES ID NUMBER MO5036071 COUNTY LOCATION STONE	1989	D	2	80	32	0	100	0	0	0.0576	0.0040	0.0200
WOODCREST MHP ID NUMBER MO3048127 COUNTY LOCATION PHELPS	1968	E	2	292	146	0	100	0	0	0.0900	0.0290	0.0050

Missouri Public Drinking Water

Surface Water Systems




Perryville
Fort Leonard Wood
Ironton
Fredericktown
Springfield
Johnson Shut-Ins State Park
Blue Mountain Camp
Lamar
Cape Girardeau
Springfield
Sam A Baker State Park
Springfield
Piedmont
Joplin
Neosho
Poplar Bluff
Branson
College of the Ozarks

Former Hulett Lagoon Site
Combined PA/SI
Reference 48

1990 Census of
Population and Housing

Summary Population and Housing Characteristics

Missouri

STOCK # 003-024-07326-9

$ 20.00

Issued August 1991

U.S. Department of Commerce
Robert A. Mosbacher, Secretary
Rockwell A. Schnabel, Deputy Secretary

Economics and Statistics Administration
Michael R. Darby, Under Secretary
for Economic Affairs and Administrator

BUREAU OF THE CENSUS
Barbara Everitt Bryant, Director

TABLE FINDING GUIDE

ubjects by Type of Geographic Area and Table Number

ubjects covered in this report are shown on the left side, and types of geographic areas are shown at the top. For a description of area classifica-ons, see appendix A. For definitions and explanations of subject characteristics, see appendix B]

ubject	The State	County	Place		County subdivision		American Indian and Alaska Native area
			By county and county subdivision	Alphabetically for the State	By county	Alphabetically for the State[1]	
OPULATION CHARACTERISTICS							
ge	1,2	1,2	1	2	1	2	17
amilies and family characteristics	5,6	5,6	5	6	5	6	18
roup quarters	5,6	5,6	5	6	5	6	...
ispanic origin	3,4	3,4	3	4	3	4	...
ouseholds and household characteristics	5,6	5,6	5	6	5	6	18
opulation density	15,16	15,16	15	16	15	16	...
ace	3,4	3,4	3	4	3	4	...
ex	3,4	3,4	3	4	3	4	17
OUSING CHARACTERISTICS							
ontract rent	11,12	11,12	11	12	11	12	18
spanic origin of householder	13,14	13,14	13	14	13	14	...
eals included in rent	11,12	11,12	11	12	11	12	...
ersons per occupied unit	9,10,11,12	9,10,11,12	9,11	10,12	9,11	10,12	...
ersons per room	7,8	7,8	7	8	7	8	...
ace of householder	13,14	13,14	13	14	13	14	...
ooms	7,8,9,10,11,12	7,8,9,10,11,12	7,9,11	8,10,12	7,9,11	8,10,12	...
enure	9,10,11,12	9,10,11,12	9,11	10,12	9,11	10,12	18
nits in structure	7,8,9,10,11,12	7,8,9,10,11,12	7,9,11	8,10,12	7,9,11	8,10,12	...
acancy characteristics	7,8	7,8	7	8	7	8	...
alue	9,10	9,10	9	10	9	10	18
ND AREA	15,16	15,16	15	16	15	16	18

... Not applicable.

[1]County subdivisions within the State are shown alphabetically with places only in the reports for the following 12 States: Connecticut, Maine, assachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Wisconsin.

Table 6. Household, Family, and Group Quarters Characteristics: 1990

[For definitions of terms and meanings of symbols, see text]

State County Place and [In Selected States] County Subdivision	Persons in households	All households	Family households			Nonfamily households				Persons per—		Persons in group quarters		
							Householder living alone							
								65 years and over						
			Total	Married-couple family	Female householder, no husband present	Total	Total	Total	Female	Household	Family	Total	Institutionalized persons	Other persons in group quarters
The State	**4 971 676**	**1 961 206**	**1 368 334**	**1 104 723**	**208 175**	**592 872**	**510 684**	**221 516**	**177 384**	**2.54**	**3.08**	**145 397**	**80 854**	**64 543**
COUNTY														
Adair County	21 279	9 060	5 408	4 551	676	3 652	2 740	1 122	908	2 35	2 96	3 298	456	2 842
Andrew County	14 340	5 429	4 185	3 673	367	1 244	1 121	616	489	2 64	3 06	292	263	29
Atchison County	6 960	2 961	2 033	1 762	200	928	830	481	380	2 35	2 87	497	173	324
Audrain County	23 009	9 205	6 667	5 670	782	2 538	2 350	1 344	1 053	2 50	3 01	590	527	63
Barry County	27 201	10 858	8 046	6 987	759	2 812	2 554	1 420	1 102	2 51	2 95	346	331	15
Barton County	11 140	4 524	3 188	2 770	319	1 336	1 253	768	594	2 46	3 01	172	110	62
Bates County	14 733	5 918	4 303	3 710	432	1 615	1 503	903	724	2 49	2 98	292	243	49
Benton County	13 651	5 764	4 212	3 727	359	1 552	1 423	826	607	2 37	2 80	208	179	29
Bollinger County	10 457	3 946	3 057	2 662	284	889	814	500	364	2 65	3 07	162	106	56
Boone County	101 696	41 937	25 573	20 602	3 965	16 364	11 531	2 770	2 248	2 42	3 01	10 683	1 145	9 538
Buchanan County	80 649	32 486	22 319	17 669	3 717	10 167	8 990	4 500	3 646	2 48	3 04	2 434	1 698	736
Butler County	38 003	15 334	10 970	8 859	1 730	4 364	3 922	2 027	1 587	2 48	2 98	762	597	165
Caldwell County	8 187	3 222	2 369	2 083	217	853	799	503	409	2 54	3 04	193	193	-
Callaway County	30 364	11 552	8 639	7 302	1 016	2 913	2 524	1 184	925	2 63	3 08	2 445	1 298	1 147
Camden County	27 190	11 305	8 596	7 685	648	2 709	2 331	1 061	778	2 41	2 76	305	253	52
Cape Girardeau County	58 261	23 390	16 158	13 550	2 077	7 232	5 933	2 511	2 051	2 49	3 02	3 372	792	2 580
Carroll County	10 570	4 332	3 016	2 580	322	1 316	1 234	809	642	2 44	3 00	178	176	2
Carter County	5 456	2 128	1 520	1 266	187	608	564	319	229	2 56	3 10	59	59	-
Cass County	62 988	22 892	17 839	15 411	1 879	5 053	4 379	2 057	1 722	2 75	3 15	820	634	186
Cedar County	11 833	5 003	3 525	3 080	340	1 478	1 371	873	681	2 37	2 86	260	260	-
Chariton County	9 055	3 661	2 597	2 295	214	1 064	1 009	639	477	2 47	3 02	147	146	1
Christian County	32 280	11 937	9 510	8 264	954	2 427	2 125	966	792	2 70	3 07	364	364	-
Clark County	7 450	2 859	2 108	1 813	197	751	701	396	304	2 61	3 09	97	97	-
Clay County	150 449	58 915	42 458	35 673	5 274	16 457	13 829	4 353	3 577	2 55	3 04	2 962	1 667	1 295
Clinton County	16 253	6 112	4 639	4 029	440	1 473	1 325	728	589	2 66	3 11	342	333	9
Cole County	58 032	22 976	15 887	13 331	2 031	7 089	6 286	2 372	1 998	2 53	3 11	5 547	5 108	439
Cooper County	13 561	5 359	3 903	3 360	417	1 456	1 338	787	634	2 53	3 02	1 274	1 080	194
Crawford County	18 901	7 299	5 455	4 722	538	1 844	1 677	938	731	2 59	3 05	272	259	13
Dade County	7 235	2 976	2 098	1 846	182	878	824	515	400	2 43	2 96	214	211	3
Dallas County	12 507	4 899	3 648	3 158	355	1 251	1 158	703	531	2 55	3 02	139	121	18
Daviess County	7 765	3 040	2 211	1 976	172	829	776	520	420	2 55	3 08	100	100	-
DeKalb County	7 781	3 054	2 246	2 000	176	808	763	498	404	2 55	3 05	2 186	2 178	8
Dent County	13 499	5 327	3 938	3 394	435	1 389	1 270	787	630	2 53	3 00	203	157	46
Douglas County	11 761	4 587	3 409	2 993	291	1 178	1 069	614	479	2 56	3 03	115	102	13
Dunklin County	32 522	13 128	9 292	7 345	1 614	3 836	3 566	2 102	1 721	2 48	3 01	590	552	38
Franklin County	79 786	28 856	22 246	18 984	2 426	6 610	5 783	2 793	2 227	2 76	3 20	817	767	50
Gasconade County	13 735	5 543	3 959	3 461	342	1 584	1 430	851	656	2 48	2 99	271	263	8
Gentry County	6 618	2 756	1 909	1 682	172	847	808	556	466	2 40	2 96	230	213	17
Greene County	197 756	81 463	54 525	45 018	7 502	26 938	21 635	8 686	7 256	2 43	2 96	10 193	3 294	6 899
Grundy County	10 277	4 346	2 994	2 594	311	1 352	1 264	799	653	2 36	2 92	259	249	10
Harrison County	8 281	3 574	2 460	2 173	207	1 114	1 060	676	534	2 32	2 86	188	188	-
Henry County	19 700	8 189	5 689	4 837	642	2 500	2 289	1 400	1 114	2 41	2 94	344	309	35
Hickory County	7 224	3 183	2 349	2 123	164	834	776	485	350	2 27	2 67	111	111	-
Holt County	5 906	2 440	1 689	1 503	126	751	702	478	365	2 42	2 99	128	128	-
Howard County	8 898	3 571	2 518	2 114	303	1 053	960	598	469	2 49	3 03	733	219	514
Howell County	30 876	12 283	9 027	7 683	1 036	3 256	3 002	1 707	1 370	2 51	2 98	571	513	58
Iron County	10 308	3 995	2 970	2 520	347	1 025	937	554	423	2 58	3 04	418	353	65
Jackson County	621 967	252 582	164 361	121 736	34 400	88 221	74 760	26 937	21 661	2 46	3 08	11 265	7 634	3 631
Jasper County	88 285	36 134	24 890	20 428	3 549	11 244	9 904	4 885	3 991	2 44	2 98	2 180	888	1 292
Jefferson County	169 796	59 199	47 211	39 763	5 432	11 988	9 859	3 433	2 757	2 87	3 23	1 584	1 399	185
Johnson County	37 913	14 579	10 213	8 823	1 007	4 366	3 153	1 189	975	2 60	3 08	4 601	357	4 244
Knox County	4 366	1 819	1 273	1 111	114	546	511	324	267	2 40	2 94	116	77	39
Laclede County	26 650	10 420	7 749	6 652	831	2 671	2 421	1 324	1 044	2 56	3 01	508	211	297
Lafayette County	30 169	11 732	8 570	7 299	921	3 162	2 907	1 714	1 386	2 57	3 07	938	741	197
Lawrence County	29 670	11 724	8 487	7 255	928	3 237	2 950	1 733	1 384	2 53	3 03	566	555	11
Lewis County	9 326	3 745	2 655	2 284	264	1 090	989	578	461	2 49	3 02	907	253	654
Lincoln County	28 539	10 316	7 913	6 851	758	2 403	2 137	1 045	817	2 77	3 21	353	285	68
Linn County	13 544	5 704	3 837	3 346	373	1 867	1 745	1 111	892	2 37	2 97	341	339	2
Livingston County	13 798	5 645	3 910	3 345	437	1 735	1 618	944	769	2 44	3 01	794	794	-
McDonald County	16 681	6 386	4 784	4 058	504	1 602	1 434	760	603	2 61	3 05	257	156	101
Macon County	15 017	6 160	4 376	3 829	405	1 784	1 663	1 029	838	2 44	2 96	328	326	2
Madison County	10 966	4 344	3 205	2 683	388	1 139	1 041	623	486	2 52	2 99	161	161	-
Maries County	7 877	3 028	2 271	1 989	207	757	711	391	296	2 60	3 08	99	99	-
Marion County	26 826	10 728	7 412	6 137	1 013	3 316	3 042	1 675	1 367	2 50	3 08	856	541	315
Mercer County	3 655	1 577	1 079	972	66	498	470	307	245	2 32	2 88	68	61	7
Miller County	20 456	7 977	5 740	4 819	681	2 237	1 999	1 003	775	2 56	3 07	244	204	40
Mississippi County	14 218	5 411	3 968	2 908	869	1 443	1 336	781	635	2 63	3 13	224	224	-
Moniteau County	11 876	4 583	3 328	2 896	324	1 255	1 169	707	575	2 59	3 13	422	422	-
Monroe County	8 900	3 471	2 466	2 175	217	1 005	935	528	411	2 56	3 14	204	167	37
Montgomery County	11 047	4 341	3 114	2 668	326	1 227	1 133	713	550	2 54	3 06	308	308	-
Morgan County	15 287	6 269	4 629	4 097	374	1 640	1 477	836	575	2 44	2 87	287	222	65
New Madrid County	20 624	7 795	5 726	4 448	1 066	2 069	1 897	1 067	858	2 65	3 15	304	304	-
Newton County	43 745	16 886	12 678	10 982	1 267	4 208	3 736	1 937	1 540	2 59	3 04	700	471	229
Nodaway County	18 905	7 620	4 996	4 330	497	2 624	2 065	1 025	816	2 48	3 05	2 804	252	2 552
Oregon County	9 359	3 851	2 820	2 406	285	1 031	971	580	440	2 43	2 89	111	108	3
Osage County	11 848	4 262	3 181	2 800	253	1 081	950	545	414	2 78	3 31	170	170	-
Ozark County	8 495	3 486	2 616	2 319	210	870	799	469	336	2 44	2 86	103	88	15
Pemiscot County	21 549	8 210	5 757	4 086	1 411	2 453	2 268	1 340	1 043	2 62	3 21	372	327	45
Perry County	16 296	6 111	4 537	3 934	427	1 574	1 439	857	662	2 67	3 17	352	314	38
Pettis County	35 077	14 056	9 947	8 298	1 266	4 109	3 636	1 915	1 538	2 50	3 00	360	190	170
Phelps County	32 673	13 277	9 125	7 705	1 106	4 152	3 459	1 427	1 158	2 46	2 98	2 575	690	1 885
Pike County	15 629	6 083	4 380	3 670	511	1 703	1 565	907	719	2 57	3 10	340	305	35
Platte County	57 117	22 142	16 077	13 694	1 754	6 065	5 063	1 198	925	2 58	3 06	750	502	248
Polk County	20 455	8 031	5 899	5 189	523	2 132	1 837	1 059	848	2 55	3 00	1 371	454	917
Pulaski County	35 214	12 397	9 882	8 451	1 110	2 515	2 235	905	709	2 84	3 23	6 093	231	5 862
Putnam County	4 994	2 166	1 472	1 296	132	694	657	446	336	2 31	2 87	85	59	26
Ralls County	8 392	3 226	2 474	2 199	196	752	692	413	295	2 60	3 03	84	60	24
Randolph County	22 387	8 943	6 235	5 242	788	2 708	2 409	1 360	1 104	2 50	3 05	1 983	1 843	140
Ray County	21 747	8 020	6 215	5 405	592	1 805	1 640	902	713	2 71	3 13	224	224	-
Reynolds County	6 558	2 542	1 950	1 677	191	592	534	306	244	2 58	2 97	103	87	16

Table 6. Household, Family, and Group Quarters Characteristics: 1990—Con.

[For definitions of terms and meanings of symbols, see text]

State County Place and [In Selected States] County Subdivision	Persons in households	All households	Family households			Nonfamily households				Persons per—		Persons in group quarters		
							Householder living alone							
								65 years and over						
			Total	Married-couple family	Female householder, no husband present	Total	Total	Total	Female	Household	Family	Total	Institutionalized persons	Other persons in group quarters
PLACE AND COUNTY SUBDIVISION—Con.														
Bel-Nor village, St. Louis County	2 644	1 092	735	526	178	357	328	129	112	2.42	3.04	291	112	179
Bel-Ridge village, St. Louis County	3 185	1 176	807	444	299	369	313	81	58	2.71	3.28	14	14	–
Belton city, Cass County	17 881	6 393	4 873	4 003	697	1 520	1 280	400	338	2.80	3.23	269	109	160
Benton city, Scott County	575	239	169	151	13	70	67	44	38	2.41	2.95	–	–	–
Benton City town, Audrain County	139	49	42	39	1	7	6	4	3	2.84	3.10	–	–	–
Berger city, Franklin County	247	94	71	58	12	23	22	9	7	2.63	3.11	–	–	–
Berkeley city, St. Louis County	12 423	4 280	3 279	1 946	1 120	1 001	853	262	200	2.90	3.34	27	16	11
Bernie city, Stoddard County	1 847	783	546	427	98	237	224	139	114	2.36	2.88	–	–	–
Bertrand city, Mississippi County	655	266	202	156	40	64	62	35	29	2.46	2.83	37	37	–
Bethany city, Harrison County	2 817	1 307	815	696	96	492	474	302	250	2.16	2.79	188	188	–
Bethel town, Shelby County	117	61	31	24	7	30	29	20	13	1.92	2.74	–	–	–
Beverly Hills city, St. Louis County	660	275	173	97	64	102	97	39	24	2.40	3.08	–	–	–
Bevier city, Macon County	643	271	179	150	26	92	81	51	41	2.37	2.97	–	–	–
Bigelow village, Holt County	32	13	9	6	3	4	2	1	–	2.46	2.89	–	–	–
Big Lake village, Holt County	170	87	59	54	5	28	27	11	6	1.95	2.37	–	–	–
Billings city, Christian County	989	403	285	229	42	118	110	64	50	2.45	2.99	–	–	–
Birch Tree city, Shannon County	599	255	166	147	16	89	84	51	43	2.35	3.00	–	–	–
Birmingham village, Clay County	222	78	59	51	7	19	18	12	11	2.85	3.37	–	–	–
Bismarck city, St. Francois County	1 557	604	441	355	69	163	152	104	83	2.58	3.06	22	11	11
Blackburn city	308	110	83	76	3	27	26	19	14	2.80	3.29	–	–	–
Lafayette County	22	7	6	6	–	1	1	1	1	3.14	3.50	–	–	–
Saline County	286	103	77	70	3	26	25	18	13	2.78	3.27	–	–	–
Black Jack city, St. Louis County	5 857	2 000	1 596	1 295	234	404	339	121	106	2.93	3.33	271	271	–
Blackwater city, Cooper County	221	92	64	54	5	28	24	15	11	2.40	2.86	–	–	–
Blairstown city, Henry County	185	75	50	43	3	25	23	12	9	2.47	3.10	–	–	–
Bland city	640	257	176	141	20	81	69	39	33	2.49	3.05	11	3	8
Gasconade County	640	257	176	141	20	81	69	39	33	2.49	3.05	11	3	8
Osage County	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Blodgett town, Scott County	202	81	58	43	12	23	21	9	8	2.49	3.00	–	–	–
Bloomfield city, Stoddard County	1 709	744	494	391	86	250	236	157	139	2.30	2.88	91	91	–
Bloomsdale city, Ste. Genevieve County	353	142	102	92	5	40	39	28	23	2.49	3.04	–	–	–
Blue Eye town, Stone County	112	45	29	26	2	16	16	9	6	2.49	3.31	–	–	–
Blue Springs city, Jackson County	39 896	13 529	11 055	9 426	1 285	2 474	2 012	616	520	2.95	3.29	257	240	17
Blythedale village, Harrison County	130	58	33	28	4	25	24	17	14	2.24	3.12	–	–	–
Bogard city, Carroll County	228	93	69	57	7	24	23	15	12	2.45	2.87	–	–	–
Bolckow city, Andrew County	253	93	65	58	7	28	28	11	6	2.72	3.46	–	–	–
Bolivar city, Polk County	5 866	2 607	1 620	1 372	205	987	816	492	423	2.25	2.82	979	237	742
Bonne Terre city, St. Francois County	3 819	1 474	1 037	819	180	437	405	264	228	2.59	3.17	52	41	11
Boonville city, Cooper County	5 870	2 503	1 660	1 338	263	843	782	454	384	2.35	2.92	1 225	1 031	194
Bosworth city, Carroll County	334	149	103	95	6	46	43	30	25	2.24	2.71	–	–	–
Bourbon city, Crawford County	1 188	479	311	263	38	168	157	98	83	2.48	3.16	–	–	–
Bowling Green city, Pike County	2 822	1 191	762	581	142	429	405	231	195	2.37	3.04	154	119	35
Bragg City town, Pemiscot County	117	44	35	33	2	9	9	7	3	2.66	3.06	–	–	–
Brandsville city, Howell County	167	56	44	33	8	12	11	6	6	2.98	3.39	–	–	–
Branson city, Taney County	3 603	1 678	1 070	914	127	608	556	342	294	2.15	2.70	103	70	33
Brashear city, Adair County	318	123	93	81	10	30	30	25	22	2.59	3.10	–	–	–
Braymer city, Caldwell County	886	388	257	199	50	131	122	84	71	2.28	2.65	–	–	–
Breckenridge city, Caldwell County	418	188	117	94	14	71	64	43	37	2.22	2.83	–	–	–
Breckenridge Hills village, St. Louis County	5 404	2 091	1 449	950	396	642	523	202	151	2.58	3.08	–	–	–
Brentwood city, St. Louis County	8 149	4 025	2 130	1 725	333	1 895	1 657	484	395	2.02	2.78	1	1	–
Bridgeton city, St. Louis County	17 238	6 793	4 933	4 075	646	1 860	1 534	555	463	2.54	3.00	541	541	–
Brimson village, Grundy County	72	27	21	21	–	6	6	3	3	2.67	3.14	–	–	–
Bronaugh city, Vernon County	211	88	61	48	9	27	27	13	10	2.40	2.95	–	–	–
Brookfield city, Linn County	4 711	2 133	1 301	1 093	168	832	771	483	395	2.21	2.88	177	176	1
Brookline village, Greene County	283	111	93	84	3	18	17	6	5	2.55	2.82	–	–	–
Brooklyn Heights village, Jasper County	116	46	35	31	3	11	7	1	–	2.52	2.77	–	–	–
Browning city	331	146	94	75	14	52	50	28	24	2.27	2.86	–	–	–
Linn County	255	109	75	63	9	34	32	15	13	2.34	2.84	–	–	–
Sullivan County	76	37	19	12	5	18	18	13	11	2.05	2.95	–	–	–
Brownington town, Henry County	84	38	26	22	–	12	12	6	3	2.21	2.77	–	–	–
Brumley town, Miller County	81	32	25	16	8	7	5	2	2	2.53	2.72	–	–	–
Brunswick city, Chariton County	1 023	480	283	219	49	197	186	121	97	2.13	2.82	51	50	1
Bucklin city, Linn County	616	277	168	142	22	109	105	75	56	2.22	2.95	–	–	–
Buckner city, Jackson County	2 873	1 007	782	617	129	225	208	107	93	2.85	3.28	–	–	–
Buffalo city, Dallas County	2 312	1 039	644	479	137	395	377	264	220	2.23	2.88	102	102	–
Bunceton city, Cooper County	341	144	95	78	12	49	44	27	24	2.37	2.94	–	–	–
Bunker city	390	152	104	83	15	48	45	30	22	2.57	3.22	–	–	–
Dent County	159	59	39	34	4	20	17	13	9	2.69	3.46	–	–	–
Reynolds County	231	93	65	49	11	28	28	17	13	2.48	3.08	–	–	–
Burgess town, Barton County	97	31	22	20	2	9	7	5	3	3.13	3.91	–	–	–
Burlington Junction city, Nodaway County	624	267	169	147	18	98	97	63	56	2.34	3.06	10	–	10
Butler city, Bates County	3 913	1 717	1 133	903	180	584	545	360	309	2.28	2.84	186	186	–
Butterfield village, Barry County	248	93	73	65	3	25	21	11	10	2.53	2.96	–	–	–
Byrnes Mill city, Jefferson County	1 578	559	438	374	44	121	87	28	23	2.82	3.20	–	–	–
Cabool city, Texas County	1 931	871	546	429	105	325	315	211	177	2.22	2.88	75	75	–
Cainsville city, Harrison County	387	189	116	99	9	73	71	48	37	2.05	2.68	–	–	–
Cairo village, Randolph County	282	110	74	64	9	36	36	26	19	2.56	3.30	–	–	–
Caledonia village, Washington County	142	65	38	30	4	27	27	25	21	2.18	3.00	–	–	–
Calhoun city, Henry County	450	187	126	103	20	61	58	39	27	2.41	3.03	–	–	–
California city, Moniteau County	3 333	1 471	927	751	146	544	516	323	283	2.27	2.93	132	132	–
Callao city, Macon County	332	137	93	82	10	44	36	20	13	2.42	3.00	–	–	–
Calverton Park village, St. Louis County	1 404	523	408	343	56	115	101	43	30	2.68	3.10	–	–	–
Camden city, Ray County	238	92	66	55	6	26	22	11	9	2.59	3.03	–	–	–
Camden Point city, Platte County	373	125	106	96	7	19	16	10	9	2.98	3.28	–	–	–
Camdenton city, Camden County	2 544	1 105	717	540	148	388	352	201	178	2.30	2.90	17	17	–
Cameron city	4 632	1 989	1 293	1 054	198	696	647	375	337	2.33	2.96	199	199	–
Clinton County	3 737	1 544	1 053	853	164	491	446	237	208	2.42	2.99	54	54	–
De Kalb County	895	445	240	201	34	205	201	138	129	2.01	2.83	145	145	–
Campbell city, Dunklin County	2 075	904	576	441	114	328	305	206	159	2.30	2.94	90	90	–
Canalou city, New Madrid County	319	128	97	86	9	31	30	18	14	2.49	2.95	–	–	–
Canton city, Lewis County	1 969	870	533	444	63	337	304	178	154	2.26	2.91	654	–	654

MODINE

Former Hulett Lagoon Site
Combined PA/SI
Reference 49

Certified Mail P 917 752 129
Return Receipt Requested

July 2, 1997

Darleen Westcott
Environmental Engineer
Hazardous Waste Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Dear Ms. Westcott:

Enclosed are the latest quarterly groundwater sampling results from the well installed at the Modine Manufacturing Company Camdenton site. The results show 120 ppb in MW-4. If you have any questions, please contact me at (414) 636-1649 or at the letterhead address.

Sincerely,

Thomas S. Sanicola
Environmental Engineer

Enclosure
cc: Modine Manufacturing - Camdenton
N. Gladding - Bryan Cave
file(2)

Modine Manufacturing Company
1500 DeKoven Avenue
Racine, Wisconsin 53403

Telephone 414-636-1200
Telex 26-4447
FAX 414-636-1424

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

2135 East Sunshine, Suite 105
Springfield, Missouri 65804
417 881 3927 Tel
417 881 6361 Fax

June 30, 1997

Mr. Thomas S. Sanicola
Environmental Engineer
Modine Manufacturing Company
1500 DeKoven Avenue
Racine, Wisconsin 53403

RE: JUNE 1997 QUARTERLY SAMPLING ANALYTICAL RESULTS FOR THE MODINE HEAT TRANSFER, INC. SITE CAMDENTON, MISSOURI

Dear Mr. Sanicola:

The purpose of this letter is to present the analytical results for the June 1997 quarterly sampling event at the Modine Heat Transfer, Inc. Site located in Camdenton, Missouri. The groundwater sample was collected on June 4, 1997 and was analyzed for volatile organic compounds (VOCs) with Trichloroethene (TCE) as the primary constituent of concern. The laboratory reporting limit for TCE was 5 parts per billion (ppb).

The results are as follows:

Well Identification	Location	Results
MW-1	West of facility	Quarterly Sampling no longer required
MW-2	East of facility	Quarterly Sampling no longer required
MW-3	Southwest of facility	Quarterly Sampling no longer required
MW-4	Northwest of facility	TCE detected at 120 ppb

Enclosed is a copy of the laboratory analytical results for this sampling event and a table comparing the results over the last seven sampling events.

Mr. Thomas S. Sanicola
Modine Manufacturing Company
Re: Quarterly Sampling Analytical Results
Modine Heat Transfer, Inc.
June 30, 1997
Page 2

Please call either Mr. Price at (314) 993-4599 or Ms. Francis at (417) 881-3927 to discuss any comments or questions you may have.

Very truly yours,

DAMES & MOORE

DJW

Miesche M. Francis
Staff Geologist

DJW

Daniel J. Price, P.G.
Senior Geologist

Enclosures

c: Don Mans - Modine Heat Transfer, Inc.

GROUNDWATER ANALYTICAL RESULTS
MODINE HEAT TRANSFER, INC.
CAMDENTON, MISSOURI
AUGUST 1995 - JUNE 1997

TCE CONCENTRATIONS								
Well ID	**8/16, 22/95**	**11/16/95**	**2/15, 16/96**	**5/16/96**	**8/20/96**	**12/12/96**	**2/28/97, 3/3/97**	**6/4/97**
MW-1	11.8	9.4	ND (Dup. 5.4)	ND	ND	ND (Dup. ND)	NT	NT
MW-2	ND (Dup. ND)	ND	ND	ND	NT	NT	NT	NT
MW-3	8.0	ND	6.6	ND	ND (Dup. ND)	NS	ND	NT
MW-4	88.9	142 (Dup. 154)	173.0	10.0	NS	NS	34 (Dup. 37)	120

Results in this table are presented in parts per billion (ppb).
NT - Not Tested
ND - Not Detected at or above 5 ppb
NS - Not Sampled due to insufficient volume

AMERICAN TECHNICAL & ANALYTICAL SERVICES, INC.
875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 • FAX (314) 434-0080

June 18, 1997

Miesche Francis
Dames & Moore
2135 E Sunshine Street, Suite 105
Springfield, MO 65804

RE: ATAS #19097.01
#27397-005-045 - Modine

Dear Mr. Francis:

Enclosed is the analytical report for the sample received in our laboratory on June 6, 1997.

If, in your review, you should have any questions or require additional information, please call Rhonda Tinker, Assistant Project Manager, or me at (314) 434-4570.

Thank you for choosing ATAS for your analytical needs.

Sincerely,

Richard H. Mannz
Project Manager

Enclosures

RHM/dms

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: DAMES & MOORE
2135 E SUNSHINE STREET, SUITE 105
SPRINGFIELD, MO 65804
ATTN: MIESCHE FRANCIS

REPORT: 1909701V(286)
DATE : 06-18-97

SAMPLE MATRIX : WATER
ATAS # : 19097.01
DATE SUBMITTED: 06-06-97
DATE ANALYZED : 06-12-97
METHOD REF. : SW846-8240, EPA METHODOLOGY
PROJECT : #27397-005-045 - MODINE
SAMPLE ID : MW-4

RESULTS REPORTED IN ug/L OR Parts Per Billion (PPB)

VOLATILES	R.L.	RESULTS
TRICHLOROETHENE	5	120

QA/QC SURROGATE RECOVERIES

TOLUENE-d8(80-116) 101% BROMOFLUOROBENZENE(86-115) 103%
1,2-DICHLOROETHANE-D4(76-114) 103%

B = ANALYTE DETECTED IN METHOD BLANK, POSSIBLY BELOW THE REPORTING LIMIT.
RL = REPORTING LIMIT; DEFINED AS THE PRACTICAL QUANTITATION LIMIT PLUS ANY DILUTION, POSITIVE VALUES BELOW THIS LIMIT WERE NOT REPORTED.
ND = NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

CLIENT: DAMES & MOORE
2135 E SUNSHINE STREET, SUITE 105
SPRINGFIELD, MO 65804
ATTN: MIESCHE FRANCIS

REPORT: 1909701V(286)
DATE : 06-18-97

SAMPLE MATRIX : WATER
ATAS # : METHOD BLANK
DATE SUBMITTED: 06-06-97
DATE ANALYZED : 06-12-97
METHOD REF. : SW846-8240, EPA METHODOLOGY
PROJECT : #27397-005-045 - MODINE
SAMPLE ID : METHOD BLANK

RESULTS REPORTED IN ug/L OR Parts Per Billion (PPB)

VOLATILES	R.L.	RESULTS
TRICHLOROETHENE	5	ND

QA/QC SURROGATE RECOVERIES

TOLUENE-d8(80-116) 101% BROMOFLUOROBENZENE(86-115) 103%
1,2-DICHLOROETHANE-D4(76-114) 86%

B = ANALYTE DETECTED IN METHOD BLANK, POSSIBLY BELOW THE REPORTING LIMIT.
RL = REPORTING LIMIT; DEFINED AS THE PRACTICAL QUANTITATION LIMIT PLUS ANY DILUTION, POSITIVE VALUES BELOW THIS LIMIT WERE NOT REPORTED.
= NOT DETECTED ABOVE REPORTING LIMIT

ATAS 875 Fee Fee Road • Maryland Heights, MO 63043 • (314) 434-4570 - FAX (314) 434-0080

LABORATORY QUALITY CONTROL SEQUENCE

SAMPLE MATRIX : WATER
DATE ANALYZED : 06-12-97
METHOD REF. : SW846-8240, EPA METHODOLOGY

REPORT DATE: 06-18-97

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	19085.05 MS % REC.	19085.05 MSD % REC.	RPD	QC RPD	ADVISORY LIMITS
1,1-DICHLOROETHENE	90	86	5	16	70-127
TRICHLOROETHENE	88	88	0	11	75-111
BENZENE	90	88	2	12	83-120
TOLUENE	90	88	2	10	80-122
CHLOROBENZENE	86	86	0	8	86-109

* = VALUES OUTSIDE OF ADVISORY LIMITS

ATAS

AMERICAN TECHNICAL & ANALYTICAL SERVICES, Inc.

875 Fee Fee Road • Maryland Heights, MO 63043-3211 • Office (314) 434-4570 • FAX (314) 434-0080

CHAIN OF CUSTODY RECORD

ATAS Client Name: Dames & Moore

Project Name: Modine

Project #: 27397-005.045

Form Completed By: M. Francis

PO #:

Sample ID	Sample Date	Sample Time	Sample Matrix	Grab	Comp	No. of Containers	Type of Analysis: VOC 8240	Preservative: Ice	Preservative: Chemical (see below)	Remarks	Lab Use Only
MW-4	6-4-97	1220	Water	✓		2	X	✓	E	TCE at a reporting limit of 5 ppb.	19097.01

Lab Use Only: Initials: LM; Date: 6-6-97; Location/Temp: 2 13c

Relinquished by:	Received by:	Relinquished by:	Received by:
Signature: Miesche Francis	Signature: L. Massenberg	Signature:	Signature:
Printed Name: Miesche Francis	Printed Name: L. Massenberg	Printed Name:	Printed Name:
Firm: Dames & Moore	Firm: ATAS	Firm:	Firm:
Date/Time: 6-4-97 1230	Date/Time: 6-6-97 0945	Date/Time:	Date/Time:

Turnaround Requirements

- ___ 1 to 2 working days
- ___ 3 working days
- ___ 5 working days
- X 10 working days
- ___ 15 working days

Preservative codes

- A - none
- B - HNO_3
- C - H_2SO_4
- D - NaOH
- E - HCl
- F - ____

SEND RESULTS TO (Name & Company): Miesche Francis Dames & Moore

Original to ATAS/Copy to Client

Continental Analytical
SERVICES, INC.

Client: Missouri Dept. of Health
Attn: Larry Evert
307 W. McCarty
Jefferson City, MO 65101

Date Sample Rptd: 04/01/93
Date Sample Recd: 03/18/93
CAS File No: 92-5364
CAS Order No: 15740
Client P.O.:

Lab Number: 93031353
Sample Description: Mulberry Well 3010130Camdenton

Date Sampled: 03/16/93
Time Sampled: 0715

Analysis	Concentration		Units	Date Analyzed	Book/Page
MDNR Regulated Vocs				03/25/93	/
1,1,1-Trichloroethane	ND(0.5)		µg/L		1546/35
1,1-Dichloroethylene	ND(0.5)		µg/L		1546/35
1,2-Dichloroethane	ND(0.5)		µg/L		1546/35
1,2-Dichloropropane	ND(0.5)		µg/L		1546/35
Benzene	ND(0.5)		µg/L		1546/35
Carbon Tetrachloride	ND(0.5)		µg/L		1546/35
cis-1,2-Dichloroethylene	ND(0.5)		µg/L		1546/35
Chlorobenzene	ND(0.5)		µg/L		1546/35
Ethylbenzene	ND(0.5)		µg/L		1546/35
o-Dichlorobenzene	ND(0.5)		µg/L		1546/35
p-Dichlorobenzene	ND(0.5)		µg/L		1546/35
Styrene	ND(0.5)		µg/L		1546/35
Tetrachloroethylene	ND(0.5)		µg/L		1546/35
Toluene	ND(0.5)		µg/L		1546/35
trans-1,2-Dichloroethylene	ND(0.5)		µg/L		1546/35
Trichloroethylene	2.1		µg/L		1546/35
Vinyl Chloride/Chloroethene	ND(0.5)		µg/L		1546/35
Xylene	ND(0.5)		µg/L		1546/35
MDNR Unregulated Vocs				03/25/93	/
1,1,1,2-Tetrachloroethane	ND(0.5)		µg/L		1546/35
1,1,2,2-Tetrachloroethane	ND(0.5)		µg/L		1546/35
1,1,2-Trichloroethane	ND(0.5)		µg/L		1546/35
1,1-Dichloroethane	ND(0.5)		µg/L		1546/35
1,1-Dichloropropene	ND(0.5)		µg/L		1546/35
1,2,3-Trichloropropane	ND(0.5)		µg/L		1546/35
1,2,4-Trichlorobenzene	ND(0.5)	Q	µg/L		1546/35
1,3-Dichloropropane	ND(0.5)		µg/L		1546/35
2,2-Dichloropropane	ND(0.5)	Q	µg/L		1546/35
Bromobenzene	ND(0.5)		µg/L		1546/35
Bromodichloromethane	ND(0.5)		µg/L		1546/35
Bromoform	ND(0.5)		µg/L		1546/35
Bromomethane	ND(0.5)		µg/L		1546/35
Chloroethane	ND(0.5)		µg/L		1546/35
Chloroform	ND(0.5)		µg/L		1546/35
Chloromethane	I		µg/L		1546/35
cis-1,3-Dichloropropene	ND(0.5)		µg/L		1546/35
Dibromochloromethane	ND(0.5)	Q	µg/L		1546/35
Dibromomethane	ND(0.5)		µg/L		1546/35
Dichloromethane	ND(0.5)		µg/L		1546/35
m-Dichlorobenzene	ND(0.5)		µg/L		1546/35

-Continued-

CONTINENTAL ANALYTICAL SERVICES, INC.

LABORATORY REPORT Page: 31

Client: Missouri Dept. of Health
Lab Number: 93031353

Analysis	Concentration	Units	Date Analyzed	Book/Page
o-Chlorotoluene	ND(0.5)	µg/L		1546/35
p-Chlorotoluene	ND(0.5)	µg/L		1546/35
trans-1,3-Dichloropropene	ND(0.5)	µg/L		1546/35

Analysis	Date Prepared	QC Batch	Analyst	Analytical Method
MDNR Regulated Vocs	NA	1GC4084	TEB	MDNR/502.2M
MDNR Unregulated Vocs	NA	1GC4084	TEB	MDNR/502.2M

Q - This compound did not meet the method Quality Control criteria.

I - Matrix interferences were noted at the time of analysis.

Laboratory analyses were performed on samples utilizing procedures published in Title 40 of the Code of Federal Regulations part 136, July 1, 1986 or in EPA Publication, SW-846, 3rd edition, Nov. 1986. ND(), where noted, indicates none detected with the detection limit in parentheses.

Samples will be retained for thirty days unless otherwise notified.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker

Clifford J. Baker
Laboratory Director

CAS

Client: Missouri Dept. of Health
Attn: Larry Evert
307 W. McCarty
Jefferson City, MO 65101

Date Sample Rptd: 04/01/93
Date Sample Recd: 03/18/93
CAS File No: 92-5364
CAS Order No: 15740
Client P.O.:

Lab Number: 93031354
Sample Description: Blair Well 3010130 Camdenton

Date Sampled: 03/16/93
Time Sampled: 0729

Analysis	Concentration		Units	Date Analyzed	Book/Page
MDNR Regulated Vocs				03/27/93	/
1,1,1-Trichloroethane	ND(0.5)		µg/L		1536/28
1,1-Dichloroethylene	ND(0.5)		µg/L		1536/28
1,2-Dichloroethane	ND(0.5)		µg/L		1536/28
1,2-Dichloropropane	ND(0.5)		µg/L		1536/28
Benzene	ND(0.5)		µg/L		1536/28
Carbon Tetrachloride	ND(0.5)		µg/L		1536/28
cis-1,2-Dichloroethylene	ND(0.5)		µg/L		1536/28
Chlorobenzene	ND(0.5)		µg/L		1536/28
Ethylbenzene	ND(0.5)		µg/L		1536/28
o-Dichlorobenzene	ND(0.5)		µg/L		1536/28
p-Dichlorobenzene	ND(0.5)		µg/L		1536/28
Styrene	ND(0.5)		µg/L		1536/28
Tetrachloroethylene	ND(0.5)		µg/L		1536/28
Toluene	ND(0.5)		µg/L		1536/28
trans-1,2-Dichloroethylene	ND(0.5)		µg/L		1536/28
Trichloroethylene	ND(0.5)		µg/L		1536/28
Vinyl Chloride/Chloroethene	ND(0.5)		µg/L		1536/28
Xylene	ND(0.5)		µg/L		1536/28
MDNR Unregulated Vocs				03/27/93	/
1,1,1,2-Tetrachloroethane	ND(0.5)		µg/L		1536/28
1,1,2,2-Tetrachloroethane	ND(0.5)	Q	µg/L		1536/28
1,1,2-Trichloroethane	ND(0.5)		µg/L		1536/28
1,1-Dichloroethane	ND(0.5)		µg/L		1536/28
1,1-Dichloropropene	ND(0.5)		µg/L		1536/28
1,2,3-Trichloropropane	ND(0.5)	Q	µg/L		1536/28
1,2,4-Trichlorobenzene	ND(0.5)		µg/L		1536/28
1,3-Dichloropropane	ND(0.5)		µg/L		1536/28
2,2-Dichloropropane	ND(0.5)		µg/L		1536/28
Bromobenzene	ND(0.5)		µg/L		1536/28
Bromodichloromethane	ND(0.5)		µg/L		1536/28
Bromoform	ND(0.5)	Q	µg/L		1536/28
Bromomethane	ND(0.5)		µg/L		1536/28
Chloroethane	ND(0.5)		µg/L		1536/28
Chloroform	ND(0.5)		µg/L		1536/28
Chloromethane	ND(0.5)		µg/L		1536/28
cis-1,3-Dichloropropene	ND(0.5)		µg/L		1536/28
Dibromochloromethane	ND(0.5)	Q	µg/L		1536/28
Dibromomethane	ND(0.5)		µg/L		1536/28
Dichloromethane	ND(0.5)		µg/L		1536/28
m-Dichlorobenzene	ND(0.5)		µg/L		1536/28

-Continued-

Client: Missouri Dept. of Health
Lab Number: 93031354

Analysis	Concentration	Units	Date Analyzed	Book/Page
o-Chlorotoluene	ND(0.5)	µg/L		1536/28
p-Chlorotoluene	ND(0.5)	µg/L		1536/28
trans-1,3-Dichloropropene	ND(0.5)	µg/L		1536/28

Analysis	Date Prepared	QC Batch	Analyst	Analytical Method
MDNR Regulated Vocs	NA	1GC3085	DKT	MDNR/502.2M
MDNR Unregulated Vocs	NA	1GC3085	DKT	MDNR/502.2M

Q - This compound did not meet the method Quality Control criteria.

Laboratory analyses were performed on samples utilizing procedures published in Title 40 of the Code of Federal Regulations part 136, July 1, 1986 or in EPA Publication, SW-846, 3rd edition, Nov. 1986. ND(), where noted, indicates none detected with the detection limit in parentheses.

Samples will be retained for thirty days unless otherwise notified.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker
Laboratory Director

CAS

Client: Missouri Dept. of Health
Attn: Larry Evert
307 W. McCarty
Jefferson City, MO 65101

Date Sample Rptd: 04/01/93
Date Sample Recd: 03/18/93
CAS File No: 92-5364
CAS Order No: 15740
Client P.O.:

Lab Number: 93031355
Sample Description: Rodeo Well 3010130 Camdenton

Date Sampled: 03/16/93
Time Sampled: 0740

Analysis	Concentration		Units	Date Analyzed	Book/Page
MDNR Regulated Vocs				03/27/93	/
1,1,1-Trichloroethane	ND(0.5)		µg/L		1536/29
1,1-Dichloroethylene	ND(0.5)		µg/L		1536/29
1,2-Dichloroethane	ND(0.5)		µg/L		1536/29
1,2-Dichloropropane	ND(0.5)		µg/L		1536/29
Benzene	ND(0.5)		µg/L		1536/29
Carbon Tetrachloride	ND(0.5)		µg/L		1536/29
cis-1,2-Dichloroethylene	ND(0.5)		µg/L		1536/29
Chlorobenzene	ND(0.5)		µg/L		1536/29
Ethylbenzene	ND(0.5)		µg/L		1536/29
o-Dichlorobenzene	ND(0.5)		µg/L		1536/29
p-Dichlorobenzene	ND(0.5)		µg/L		1536/29
Styrene	ND(0.5)		µg/L		1536/29
Tetrachloroethylene	ND(0.5)		µg/L		1536/29
Toluene	ND(0.5)		µg/L		1536/29
trans-1,2-Dichloroethylene	ND(0.5)		µg/L		1536/29
Trichloroethylene	ND(0.5)		µg/L		1536/29
Vinyl Chloride/Chloroethene	ND(0.5)		µg/L		1536/29
Xylene	ND(0.5)		µg/L		1536/29
MDNR Unregulated Vocs				03/27/93	/
1,1,1,2-Tetrachloroethane	ND(0.5)		µg/L		1536/29
1,1,2,2-Tetrachloroethane	ND(0.5)	Q	µg/L		1536/29
1,1,2-Trichloroethane	ND(0.5)		µg/L		1536/29
1,1-Dichloroethane	ND(0.5)		µg/L		1536/29
1,1-Dichloropropene	ND(0.5)		µg/L		1536/29
1,2,3-Trichloropropane	ND(0.5)	Q	µg/L		1536/29
1,2,4-Trichlorobenzene	ND(0.5)		µg/L		1536/29
1,3-Dichloropropane	ND(0.5)		µg/L		1536/29
2,2-Dichloropropane	ND(0.5)		µg/L		1536/29
Bromobenzene	ND(0.5)		µg/L		1536/29
Bromodichloromethane	ND(0.5)		µg/L		1536/29
Bromoform	ND(0.5)	Q	µg/L		1536/29
Bromomethane	ND(0.5)		µg/L		1536/29
Chloroethane	ND(0.5)		µg/L		1536/29
Chloroform	ND(0.5)		µg/L		1536/29
Chloromethane	ND(0.5)		µg/L		1536/29
cis-1,3-Dichloropropene	ND(0.5)		µg/L		1536/29
Dibromochloromethane	ND(0.5)	Q	µg/L		1536/29
Dibromomethane	ND(0.5)		µg/L		1536/29
Dichloromethane	ND(0.5)		µg/L		1536/29
m-Dichlorobenzene	ND(0.5)		µg/L		1536/29

-Continued-

CONTINENTAL ANALYTICAL SERVICES, INC.

LABORATORY REPORT Page: 35

Client: Missouri Dept. of Health
Lab Number: 93031355

Analysis	Concentration	Units	Date Analyzed	Book/Page
o-Chlorotoluene	ND(0.5)	µg/L		1536/29
p-Chlorotoluene	ND(0.5)	µg/L		1536/29
trans-1,3-Dichloropropene	ND(0.5)	µg/L		1536/29

Analysis	Date Prepared	QC Batch	Analyst	Analytical Method
MDNR Regulated Vocs	NA	1GC3085	DKT	MDNR/502.2M
MDNR Unregulated Vocs	NA	1GC3085	DKT	MDNR/502.2M

Q - This compound did not meet the method Quality Control criteria.

Laboratory analyses were performed on samples utilizing procedures published in Title 40 of the Code of Federal Regulations part 136, July 1, 1986 or in EPA Publication, SW-846, 3rd edition, Nov. 1986. ND(), where noted, indicates none detected with the detection limit in parentheses.

Samples will be retained for thirty days unless otherwise notified.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker

Clifford J. Baker
Laboratory Director

CAS

Client: Missouri Dept. of Health
Attn: Larry Evert
307 W. McCarty
Jefferson City, MO 65101

Date Sample Rptd: 04/01/93
Date Sample Recd: 03/18/93
CAS File No: 92-5364
CAS Order No: 15740
Client P.O.:

Lab Number: 93031356
Sample Description: Trip Blank 3010130 Camdenton

Date Sampled: / /
Time Sampled:

Analysis	Concentration		Units	Date Analyzed	Book/Page
MDNR Regulated Vocs				03/26/93	/
1,1,1-Trichloroethane	ND(0.5)		µg/L		1546/36
1,1-Dichloroethylene	ND(0.5)		µg/L		1546/36
1,2-Dichloroethane	ND(0.5)		µg/L		1546/36
1,2-Dichloropropane	ND(0.5)		µg/L		1546/36
Benzene	ND(0.5)		µg/L		1546/36
Carbon Tetrachloride	ND(0.5)		µg/L		1546/36
cis-1,2-Dichloroethylene	ND(0.5)		µg/L		1546/36
Chlorobenzene	ND(0.5)		µg/L		1546/36
Ethylbenzene	ND(0.5)		µg/L		1546/36
o-Dichlorobenzene	ND(0.5)		µg/L		1546/36
p-Dichlorobenzene	ND(0.5)		µg/L		1546/36
Styrene	ND(0.5)		µg/L		1546/36
Tetrachloroethylene	ND(0.5)		µg/L		1546/36
Toluene	ND(0.5)		µg/L		1546/36
trans-1,2-Dichloroethylene	ND(0.5)		µg/L		1546/36
Trichloroethylene	ND(0.5)		µg/L		1546/36
Vinyl Chloride/Chloroethene	ND(0.5)		µg/L		1546/36
Xylene	ND(0.5)		µg/L		1546/36
MDNR Unregulated Vocs				03/26/93	/
1,1,1,2-Tetrachloroethane	ND(0.5)		µg/L		1546/36
1,1,2,2-Tetrachloroethane	ND(0.5)		µg/L		1546/36
1,1,2-Trichloroethane	ND(0.5)		µg/L		1546/36
1,1-Dichloroethane	ND(0.5)		µg/L		1546/36
1,1-Dichloropropene	ND(0.5)		µg/L		1546/36
1,2,3-Trichloropropane	ND(0.5)		µg/L		1546/36
1,2,4-Trichlorobenzene	ND(0.5)	Q	µg/L		1546/36
1,3-Dichloropropane	ND(0.5)		µg/L		1546/36
2,2-Dichloropropane	ND(0.5)	Q	µg/L		1546/36
Bromobenzene	ND(0.5)		µg/L		1546/36
Bromodichloromethane	ND(0.5)		µg/L		1546/36
Bromoform	ND(0.5)	Q	µg/L		1546/36
Bromomethane	ND(0.5)		µg/L		1546/36
Chloroethane	ND(0.5)		µg/L		1546/36
Chloroform	ND(0.5)		µg/L		1546/36
Chloromethane	I		µg/L		1546/36
cis-1,3-Dichloropropene	ND(0.5)		µg/L		1546/36
Dibromochloromethane	ND(0.5)	Q	µg/L		1546/36
Dibromomethane	ND(0.5)		µg/L		1546/36
Dichloromethane	ND(0.5)		µg/L		1546/36
m-Dichlorobenzene	ND(0.5)		µg/L		1546/36

-Continued-

Client: Missouri Dept. of Health
Lab Number: 93031356

Analysis	Concentration	Units	Date Analyzed	Book/Page
o-Chlorotoluene	ND(0.5)	µg/L		1546/36
p-Chlorotoluene	ND(0.5)	µg/L		1546/36
trans-1,3-Dichloropropene	ND(0.5)	µg/L		1546/36

Analysis	Date Prepared	QC Batch	Analyst	Analytical Method
MDNR Regulated Vocs	NA	1GC4084	TEB	MDNR/502.2M
MDNR Unregulated Vocs	NA	1GC4084	TEB	MDNR/502.2M

Q - This compound did not meet the method Quality Control criteria.

I - Matrix interferences were noted at the time of analysis.

Laboratory analyses were performed on samples utilizing procedures published in Title 40 of the Code of Federal Regulations part 136, July 1, 1986 or in EPA Publication, SW-846, 3rd edition, Nov. 1986. ND(), where noted, indicates none detected with the detection limit in parentheses.

Samples will be retained for thirty days unless otherwise notified.

CONTINENTAL ANALYTICAL SERVICES, INC.

Clifford J. Baker
Laboratory Director

CAS

STATE OF MISSOURI
Mel Carnahan Governor • David A. Shorr Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 94-C602

Reported to: TERRY TIMMONS
Affiliation: PDW

Date: 5/13/94
Project Code: 3404/3000

Sample Description:
CAMDENTON, MULBERRY WELL
MO3010130

Collected by: BOB MARSHALL
Affiliation: MISC

Date: 04/27/94

PARAMETERS	RESULTS
VOC Results:	
Benzene	<0.5 ug/L
Bromobenzene	<1.0 ug/L
Bromochloromethane	<1.0 ug/L
Bromodichloromethane	<1.0 ug/L
Bromoform	<2.5 ug/L
Bromomethane	<2.5 ug/L
n-Butylbenzene	<2.0 ug/L
sec-Butylbenzene	<2.0 ug/L
tert-Butylbenzene	<2.0 ug/L
Carbon tetrachloride	<0.5 ug/L
Chlorobenzene	<0.5 ug/L
Chloroethane	<2.5 ug/L
Chloroform	<1.0 ug/L
Chloromethane	<2.5 ug/L
2-Chlorotoluene	<2.0 ug/L
4-Chlorotoluene	<2.0 ug/L
Dibromochloromethane	<1.0 ug/L
1,2-Dibromo-3-chloropropane	<5.0 ug/L
1,2-Dibromoethane	<2.0 ug/L
Dibromomethane	<1.0 ug/L

STATE OF MISSOURI Mel Carnahan Governor • David A. Shorr Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P O Box 176 Jefferson City, MO 65102-0176

Sample no. 94-C602
Date 5/13/94

PARAMETERS	RESULTS
1,1,2-Trichloroethane	<0.5 ug/L
Trichloroethene	<0.5 ug/L
Trichlorofluoromethane	<2.5 ug/L
1,2,3-Trichloropropane	<1.0 ug/L
1,2,4-Trimethylbenzene	<1.0 ug/L
1,3,5-Trimethylbenzene	<2.0 ug/L
Vinyl Chloride	<0.5 ug/L
o-Xylene	<0.5 ug/L
m&p-xylene	<0.5 ug/L

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P O Box 176 Jefferson City MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

BOB MARSHALL
CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 97-A758

Sample Number: 97-A466

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: February 24, 1997
Date Collected: January 29, 1997
Sample Location: MULBERRY WELL HOUSE
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	3.8	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 97-A758
Sample Number: 97-A466

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chlorobenz	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI

Mel Carnahan, Governor • David A. Shorr, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Sample Number: 97-0486
Lab Number: 97-A2244

Reported To: JIM HOULIHAN
Affiliation: JCRO
Project Code: 3404/3000

Report Date: 3/17/97
Date Collected: 3/12/97
Date Received: 3/12/97

Sample Collected by: JIM HOULIHAN, JCRO
PWS Supply Name: CAMDENTON
PWS Identification: MO3010130
PWS County: CAMDEN
Sampling Location: MULBERRY WELL
Sample Description: CONFIRMATION SAMPLE

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	3.8	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L

Lab Number: 97-A2244
Sample Number: 97-0486

Analysis Performed	Results	MCL	Units
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chlorobenz	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: TERRY TIMMONS, PDWP

STATE OF MISSOURI

Mel Carnahan, Governor • David A. Shorr, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

BOB MARSHALL
CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 97-A4822

Sample Number: 97-F101

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: June 13, 1997
Date Collected: June 3, 1997
Sample Location: MULBERRY WELL HOUSE
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	4.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L

Lab Number: 97-A4822
Sample Number: 97-F101

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chlorobenz	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI

Mel Carnahan Governor • David A. Shorr Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

BOB MARSHALL
CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 97-A7751

Sample Number: 97-I658

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: September 4, 1997
Date Collected: August 26, 1997
Sample Location: MULBERRY WELL HOUSE
PWS Name: CAMDENTON

PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	4.3	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L

Lab Number: 97-A7751
Sample Number: 97-I658

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chlorobenz	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P O Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE - CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 97-A7752

Sample Number: 97-I659

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: September 4, 1997
Date Collected: August 26, 1997
Sample Location: MULBERRY WELL HOUSE
PWS Name: CAMDENTON

PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	4.3	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L

Lab Number: 97-A7752
Sample Number: 97-I659

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chlorobenz	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI

Mel Carnahan, Governor • David A. Shorr, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 97-A11630

Sample Number: 97-L708

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: December 18, 1997
Date Collected: December 1, 1997
Sample Location: MULBERRY WELL HOUSE
PWS Name: CAMDENTON

PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	4.4	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L

RECYCLED PAPER

Lab Number: 97-A11630
Sample Number: 97-L708

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
FEB 23 1998

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A896

Sample Number: 98-B383

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: February 18, 1998
Date Collected: February 2, 1998
PWS ID: MO3010130
Sample Location: MULBERRY WELL, SPECIAL REQUEST
PWS Name: CAMDENTON

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	6.3	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

RECEIVED
FEB 1 6 1998
PUBLIC DRINKING WATER

Report Date: February 18, 1998

Lab Number: 98-A896
Sample Number: 98-B383

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
MAR 20 1998
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

STATE OF MISSOURI
Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A1807

Sample Number: 98-C482

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: March 11, 1998
Date Collected: February 17, 1998
Sample Location: MULBERRY WELL HOUSE
PWS Name: CAMDENTON
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	5.2	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L

Report Date: March 11, 1998

Lab Number: 98-A1807
Sample Number: 98-C482

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
APR 15 1998

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A3749

Sample Number: 98-B784

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: March 31, 1998
Date Collected: March 25, 1998
Sample Location: MULBERRY WELL
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	3.6	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 98-A3749
Sample Number: 98-B784

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED

NOV 0 2 1998

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A4982

Sample Number: 98-F440

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: May 7, 1998
Date Collected: April 23, 1998
Sample Location: MULBERRY WELL HOUSE
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	4.1	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 98-A4982
Sample Number: 98-F440

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
NOV 0 2 1998

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P O Box 176 Jefferson City MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A6299

Sample Number: 98-H069

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: June 9, 1998
Date Collected: May 21, 1998
Sample Location: MULBERRY WELL
PWS Name: CAMDENTON

PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	11.8	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L

RECEIVED
JUN 1 9 1998

Lab Number: 98-A6299
Sample Number: 98-H069

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
NOV 0 2 1998

STATE OF MISSOURI
Mel Carnahan Governor • Stephen M. Mahfood Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A6820

Sample Number: 98-F519

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: June 18, 1998
Date Collected: June 8, 1998
Sample Location: MULBERRY WELL
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	5.1	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

RECYCLED PAPER

Lab Number: 98-A6820
Sample Number: 98-F519

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
NOV 02 1998

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

PO Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE - CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A14822

Sample Number: 98-U834

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: September 9, 1998
Date Collected: August 25, 1998
Sample Location: MULBERRY WELL
PWS Name: CAMDENTON

PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 200	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	4.2	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 1.0	1000	ug/L

Lab Number: 98-A14822
Sample Number: 98-U834

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

Missouri Department of Natural Resources

E-mail is for official department use only. Copies of messages may be archived indefinitely and reviewed as appropriate.

From Dianne Holtmeyer on 01/25/99 03:30:50 PM

To: Valerie Wilder/HWP/DEQ/MODNR@MODNR
cc: TERRY TIMMONS@NetTalk @ MODNR
Subject: Camdenton

Fourth quarter TCE results for samples collected on 12/2/98 at Camdenton (MO3010130) were:

Blair Well	-	<0.50 ug/L (No detect)
Rodeo Well	-	<0.50 ug/L (No detect)
Mulberry Well	-	4.40 ug/L
Hickory Well	-	<0.50 ug/L (No detect)

Dianne Holtmeyer
Missouri Department of Natural Resources
Public Drinking Water Program
P.O. Box 176
Jefferson City, MO 65102
Phone: (573) 526-3479/Fax: (573) 751-3110
Internet mail: nrholtd@mail.dnr.state.mo.us

RECEIVED

MAR 2 2 1999

HAZARDOUS WASTE PROGRAM
DEPARTMENT OF
NATURAL RESOURCES

STATE OF MISSOURI

Mel Carnahan Governor • Stephen M Mahfood Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 99-A402

Sample Number: 9901502

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: March 10, 1999
Date Collected: January 13, 1999 PWS ID: MO3010130
Sample Location: MULBERRY WELL, SPECIAL REQUEST
PWS Name: CAMDENTON

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 2.5	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	1.3	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	26.2	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Recycled Paper

Lab Number: 99-A402
Sample Number: 9901502

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 20.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 5.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 0.5	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 94-C603

Reported to: TERRY TIMMONS
Affiliation: PDW

Date: 5/13/94
Project Code: 3404/3000

Sample Description:
CAMDENTON, BLAIR WELL
MO3010130

Collected by: BOB MARSHALL
Affiliation: MISC

Date: 04/27/94

PARAMETERS	RESULTS
VOC Results:	
Benzene	<0.5 ug/L
Bromobenzene	<1.0 ug/L
Bromochloromethane	<1.0 ug/L
Bromodichloromethane	<1.0 ug/L
Bromoform	<2.5 ug/L
Bromomethane	<2.5 ug/L
n-Butylbenzene	<2.0 ug/L
sec-Butylbenzene	<2.0 ug/L
tert-Butylbenzene	<2.0 ug/L
Carbon tetrachloride	<0.5 ug/L
Chlorobenzene	<0.5 ug/L
Chloroethane	<2.5 ug/L
Chloroform	<1.0 ug/L
Chloromethane	<2.5 ug/L
2-Chlorotoluene	<2.0 ug/L
4-Chlorotoluene	<2.0 ug/L
Dibromochloromethane	<1.0 ug/L
1,2-Dibromo-3-chloropropane	<5.0 ug/L
1,2-Dibromoethane	<2.0 ug/L
Dibromomethane	<1.0 ug/L

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P O. Box 176 Jefferson City, MO 65102-0176

Sample no. 94-C603
Date 5/13/94

PARAMETERS	RESULTS
1,2-Dichlorobenzene	<0.5 ug/L
1,3-Dichlorobenzene	<1.0 ug/L
1,4-Dichlorobenzene	<0.5 ug/L
Dichlorodifluoromethane	<2.5 ug/L
1,1-Dichloroethane	<1.0 ug/L
1,2-Dichloroethane	<0.5 ug/L
1,1-Dichloroethene	<0.5 ug/L
cis-1,2-Dichloroethene	<0.5 ug/L
trans-1,2-Dichloroethene	<0.5 ug/L
1,2-Dichloropropane	<0.5 ug/L
1,3-Dichloropropane	<2.0 ug/L
2,2-Dichloropropane	<1.0 ug/L
1,1-Dichloropropene	<1.0 ug/L
cis-1,3-Dichloropropene	<2.0 ug/L
trans-1,3-Dichloropropene	<1.0 ug/L
Ethylbenzene	<0.5 ug/L
Hexachlorobutadiene	<1.0 ug/L
Isopropylbenzene	<2.0 ug/L
p-Isopropyltoluene	<2.0 ug/L
Methylene Chloride	<0.5 ug/L
Naphthalene	<2.0 ug/L
n-Propylbenzene	<2.0 ug/L
Styrene	<0.5 ug/L
1,1,1,2-Tetrachloroethane	<1.0 ug/L
1,1,2,2-Tetrachloroethane	<1.0 ug/L
Tetrachloroethene	<0.5 ug/L
Toluene	<0.5 ug/L
1,2,3-Trichlorobenzene	<2.0 ug/L
1,2,4-Trichlorobenzene	<0.5 ug/L
1,1,1-Trichloroethane	<0.5 ug/L

STATE OF MISSOURI
Mel Carnahan Governor • David A. Shorr Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P O. Box 176 Jefferson City. MO 65102-0176

Sample no. 94-C603
Date 5/13/94

PARAMETERS	RESULTS
1,1,2-Trichloroethane	<0.5 ug/L
Trichloroethene	<0.5 ug/L
Trichlorofluoromethane	<2.5 ug/L
1,2,3-Trichloropropane	<1.0 ug/L
1,2,4-Trimethylbenzene	<1.0 ug/L
1,3,5-Trimethylbenzene	<2.0 ug/L
Vinyl Chloride	<0.5 ug/L
o-Xylene	<0.5 ug/L
m&p-xylene	<0.5 ug/L

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

BOB MARSHALL
CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 97-A759

Sample Number: 97-A467

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: February 24, 1997
Date Collected: January 29, 1997
Sample Location: BLAIR ST WELL HOUSE
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 97-A759
Sample Number: 97-A467

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chlorobenz	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
FEB 23 1998
ENVIRONMENTAL SERVICES PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

STATE OF MISSOURI
Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A898

Sample Number: 98-B385

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: February 10, 1998
Date Collected: February 2, 1998
PWS ID: MO3010130
Sample Location: BLAIR WELL, SPECIAL REQUEST
PWS Name: CAMDENTON

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Report Date: February 10, 1998

Lab Number: 98-A898
Sample Number: 98-B385

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
FEB 23 1998
DEPARTMENT OF NATURAL RESOURCES

RECEIVED
FEB 23 1998
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Date: 2/18/98
To: Terry Timmons, PDWP
From: Mary King, ESP
Subject: Samples with Results Greater than PDWP Monitoring Trigger

Sample Number	MO ID	Supplyname Analyte	Results	MCL	Trigger
98-B383	MO3010130	CAMDENTON Trichloroethene	6.3 ug/L	5.0	0.5

STATE OF MISSOURI

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A3751

Sample Number: 98-B786

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: March 31, 1998
Date Collected: March 25, 1998
Sample Location: BLAIR WELL
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 98-A3751
Sample Number: 98-B786

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
NOV 02 1998

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A4981

Sample Number: 98-F439

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: May 7, 1998
Date Collected: April 23, 1998
Sample Location: BLAIR STREET
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 98-A4981
Sample Number: 98-F439

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
JUN 0 2 1998

STATE OF MISSOURI
Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A6300

Sample Number: 98-H070

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: June 8, 1998
Date Collected: May 21, 1998
Sample Location: BLAIR WELL
PWS Name: CAMDENTON

PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L

Lab Number: 98-A6300
Sample Number: 98-H070

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
NOV 0 2 1998

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A6822

Sample Number: 98-F521

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: June 15, 1998
Date Collected: June 8, 1998
Sample Location: BLAIR WELL
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 98-A6822
Sample Number: 98-F521

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
SEP 02 1998

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE - CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A14824

Sample Number: 98-U836

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: September 9, 1998
Date Collected: August 25, 1998
Sample Location: BLAIR WELL
PWS Name: CAMDENTON

PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 200	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 1.0	1000	ug/L

Lab Number: 98-A14824
Sample Number: 98-U836

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI
Mel Carnahan Governor • David A. Shorr Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM
RESULT OF SAMPLE ANALYSIS

Sample No. 94-C601

Reported to: TERRY TIMMONS
Affiliation: PDW

Date: 5/13/
Project Code: 3404/300

Sample Description:
CAMDENTON, RODEO WELL
MO3010130

Collected by: BOB MARSHALL
Affiliation: MISC

Date: 04/27/94

PARAMETERS	RESULTS
VOC Results:	
Benzene	<0.5 ug/L
Bromobenzene	<1.0 ug/L
Bromochloromethane	<1.0 ug/L
Bromodichloromethane	<1.0 ug/L
Bromoform	<2.5 ug/L
Bromomethane	<2.5 ug/L
n-Butylbenzene	<2.0 ug/L
sec-Butylbenzene	<2.0 ug/L
tert-Butylbenzene	<2.0 ug/L
Carbon tetrachloride	<0.5 ug/L
Chlorobenzene	<0.5 ug/L
Chloroethane	<2.5 ug/L
Chloroform	<1.0 ug/L
Chloromethane	<2.5 ug/L
2-Chlorotoluene	<2.0 ug/L
4-Chlorotoluene	<2.0 ug/L
Dibromochloromethane	<1.0 ug/L
1,2-Dibromo-3-chloropropane	<5.0 ug/L
1,2-Dibromoethane	<2.0 ug/L
Dibromomethane	<1.0 ug/L

STATE OF MISSOURI Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P O Box 176 Jefferson City, MO 65102-0176

Sample no. 94-C601
Date 5/13/94

PARAMETERS	RESULTS
1,2-Dichlorobenzene	<0.5 ug/L
1,3-Dichlorobenzene	<1.0 ug/L
1,4-Dichlorobenzene	<0.5 ug/L
Dichlorodifluoromethane	<2.5 ug/L
1,1-Dichloroethane	<1.0 ug/L
1,2-Dichloroethane	<0.5 ug/L
1,1-Dichloroethene	<0.5 ug/L
cis-1,2-Dichloroethene	<0.5 ug/L
trans-1,2-Dichloroethene	<0.5 ug/L
1,2-Dichloropropane	<0.5 ug/L
1,3-Dichloropropane	<2.0 ug/L
2,2-Dichloropropane	<1.0 ug/L
1,1-Dichloropropene	<1.0 ug/L
cis-1,3-Dichloropropene	<2.0 ug/L
trans-1,3-Dichloropropene	<1.0 ug/L
Ethylbenzene	<0.5 ug/L
Hexachlorobutadiene	<1.0 ug/L
Isopropylbenzene	<2.0 ug/L
p-Isopropyltoluene	<2.0 ug/L
Methylene Chloride	<0.5 ug/L
Naphthalene	<2.0 ug/L
n-Propylbenzene	<2.0 ug/L
Styrene	<0.5 ug/L
1,1,1,2-Tetrachloroethane	<1.0 ug/L
1,1,2,2-Tetrachloroethane	<1.0 ug/L
Tetrachloroethene	<0.5 ug/L
Toluene	<0.5 ug/L
1,2,3-Trichlorobenzene	<2.0 ug/L
1,2,4-Trichlorobenzene	<0.5 ug/L
1,1,1-Trichloroethane	<0.5 ug/L

STATE OF MISSOURI
Mel Carnahan, Governor • David A. Shorr, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O Box 176 Jefferson City, MO 65102-0176

Sample no. 94-C601
Date 5/13/94

PARAMETERS	RESULTS
1,1,2-Trichloroethane	<0.5 ug/L
Trichloroethene	<0.5 ug/L
Trichlorofluoromethane	<2.5 ug/L
1,2,3-Trichloropropane	<1.0 ug/L
1,2,4-Trimethylbenzene	<1.0 ug/L
1,3,5-Trimethylbenzene	<2.0 ug/L
Vinyl Chloride	<0.5 ug/L
o-Xylene	<0.5 ug/L
m&p-xylene	<0.5 ug/L

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

BOB MARSHALL
CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 97-A760

Sample Number: 97-A468

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: February 24, 1997
Date Collected: January 29, 1997
Sample Location: RODEO WELL HOUSE
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	3.9	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

RECYCLED PAPER

Report Date: February 24, 1997

Lab Number: 97-A760
Sample Number: 97-A468

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chlorobenz	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI

Mel Carnahan, Governor • David A. Shorr, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Sample Number: 97-0487
Lab Number: 97-A2243

Reported To: JIM HOULIHAN
Affiliation: JCRO
Project Code: 3404/3000

Report Date: 3/17/97
Date Collected: 3/12/97
Date Received: 3/12/97

Sample Collected by: JIM HOULIHAN, JCRO
PWS Supply Name: CAMDENTON
PWS Identification: MO3010130
PWS County: CAMDEN
Sampling Location: RODEO WELL
Sample Description: CONFIRMATION SAMPLE

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L

RECYCLED PAPER

Lab Number: 97-A2243
Sample Number: 97-0487

Analysis Performed	Results	MCL	Units
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chlorobenz	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 2.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: TERRY TIMMONS, PDWP

RECEIVED
FEB 23 1998
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF NATURAL RESOURCES

STATE OF MISSOURI
Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A897

Sample Number: 98-B384

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: February 10, 1998
Date Collected: February 2, 1998
PWS ID: MO3010130
Sample Location: RODEO WELL, SPECIAL REQUEST
PWS Name: CAMDENTON

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 98-A897
Sample Number: 98-B384

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
FEB 1998
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

RECEIVED
NOV 0 2 1998

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A4983

Sample Number: 98-F441

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: May 7, 1998
Date Collected: April 23, 1998
Sample Location: RODEO WELL
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 98-A4983
Sample Number: 98-F441

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

STATE OF MISSOURI

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A6301

Sample Number: 98-H071

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: June 8, 1998
Date Collected: May 21, 1998
Sample Location: RODEO WELL
PWS Name: CAMDENTON

PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L

Lab Number: 98-A6301
Sample Number: 98-H071

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
NOV 0 2 1998

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
P O Box 176 Jefferson City MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE, CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A6821

Sample Number: 98-F520

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: June 15, 1998
Date Collected: June 8, 1998
Sample Location: RODEO WELL
PWS Name: CAMDENTON

PWS County: CAMDEN
PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 20.0	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 0.5	1000	ug/L
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L

Lab Number: 98-A6821
Sample Number: 98-F520

Analysis Performed	Results	MCL	Units
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

RECEIVED
NOV 0 9 1998

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY
PO Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

VINCENT COSTA
112 COURT CIRCLE - CITY HALL
P.O. BOX 1048
CAMDENTON, MO 65020

Lab Number: 98-A14823

Sample Number: 98-U835

*** QUARTERLY MONITORING ***

RESULTS OF SAMPLE ANALYSES FOR PUBLIC WATER SUPPLIES

Report Date: September 9, 1998
Date Collected: August 25, 1998
Sample Location: RODEO WELL
PWS Name: CAMDENTON

PWS ID: MO3010130

Analysis Performed	Results	MCL	Units
VOC Results:			
Dichlorodifluoromethane	< 200	--	ug/L
Chloromethane	< 2.5	--	ug/L
Vinyl Chloride	< 0.5	2.0	ug/L
Bromomethane	< 9.0	--	ug/L
Chloroethane	< 2.5	--	ug/L
Trichlorofluoromethane	< 2.5	--	ug/L
1,1-Dichloroethene	< 0.5	7.0	ug/L
Methylene Chloride	< 0.5	5.0	ug/L
Methyl-tert-butyl ether	< 5.0	--	ug/L
trans-1,2-Dichloroethene	< 0.5	100	ug/L
1,1-Dichloroethane	< 1.0	--	ug/L
2,2-Dichloropropane	< 1.0	--	ug/L
cis-1,2-Dichloroethene	< 0.5	70.0	ug/L
Chloroform	< 0.5	--	ug/L
Bromochloromethane	< 1.0	--	ug/L
1,1,1-Trichloroethane	< 0.5	200	ug/L
1,1-Dichloropropene	< 1.0	--	ug/L
Carbon Tetrachloride	< 0.5	5.0	ug/L
Benzene	< 0.5	5.0	ug/L
1,2-Dichloroethane	< 0.5	5.0	ug/L
Trichloroethene	< 0.5	5.0	ug/L
1,2-Dichloropropane	< 0.5	5.0	ug/L
Bromodichloromethane	< 0.5	--	ug/L
Dibromomethane	< 1.0	--	ug/L
cis-1,3-Dichloropropane	< 2.0	--	ug/L
Toluene	< 1.0	1000	ug/L

Lab Number: 98-A14823
Sample Number: 98-U835

Analysis Performed	Results	MCL	Units
trans-1,3-Dichloropropane	< 1.0	--	ug/L
1,1,2-Trichloroethane	< 0.5	5.0	ug/L
Tetrachloroethene	< 0.5	5.0	ug/L
1,3-Dichloropropane	< 2.0	--	ug/L
Dibromochloromethane	< 0.5	--	ug/L
1,2-Dibromoethane	< 2.0	--	ug/L
Chlorobenzene	< 0.5	100	ug/L
Ethylbenzene	< 0.5	700	ug/L
1,1,1,2-Tetrachloroethane	< 1.0	--	ug/L
Total Xylenes	< 0.5	10000	ug/L
Styrene	< 0.5	100	ug/L
Isopropylbenzene	< 2.0	--	ug/L
Bromoform	< 0.5	--	ug/L
1,1,2,2-Tetrachloroethane	< 1.0	--	ug/L
1,2,3-Trichloropropane	< 1.0	--	ug/l
n-Propylbenzene	< 2.0	--	ug/L
Bromobenzene	< 1.0	--	ug/L
2-Chlorotoluene	< 2.0	--	ug/L
4-Chlorotoluene	< 2.0	--	ug/L
1,3,5-Trimethylbenzene	< 2.0	--	ug/L
tert-Butylbenzene	< 2.0	--	ug/L
1,2,4-Trimethylbenzene	< 1.0	--	ug/L
sec-Butylbenzene	< 2.0	--	ug/L
p-isopropyltoluene	< 2.0	--	ug/L
1,3-Dichlorobenzene	< 1.0	--	ug/L
1,4-Dichlorobenzene	< 0.5	75.0	ug/L
n-Butylbenzene	< 2.0	--	ug/L
1,2-Dichlorobenzene	< 0.5	600	ug/L
1,2-Dibromo-3-Chloroprop	< 5.0	--	ug/L
1,2,4-Trichlorobenzene	< 0.5	70.0	ug/L
Hexachlorobutadiene	< 1.0	--	ug/L
Naphthalene	< 20.0	--	ug/L
1,2,3-Trichlorobenzene	< 2.0	--	ug/L

MCL = Maximum Contaminant Level -- = Not Applicable

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency. If you have any questions, please contact Mr. Terry Timmons at 573/751-1188.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

Former Hulett Lagoon Site
Combined PA/SI
Reference 51

Modine under DNR gun

By Joyce L. Miller

CAMDENTON - A Camdenton manufacturing plant is under the the gun to comply with an order from the Missouri Department of Natural Resources after being identified as a potential source of chemical contamination in the city's water supply.

DNR says Camdenton's water continues to show traces of contamination from an industrial-type cleaning chemical known as trichlethylene. So far, levels of TCE have stayed below those considered acceptable by federal and state standards.

DNR has ordered Modine Manufacturing Company to come up with a plan to address any contamination at the facilty that may pose a threat to people or the environment. Modine has 30 days to comply. Failure to do so could force DNR to take legal action against the company.

Modine engineer Bob King said the DNR order was forwarded to corporation headquarters in Racine, Wisconsin.

According to King, the order was vague and didn't contain

(Continued on page 4, col. 1)

DNR (Continued from page 1)

any specific course of action.

DNR says the order will establish a regulatory time frame and schedule for the manufacturing plant to follow, in order to deal with potential contamination at the plant's location on Sunset Drive. The plan will be negotiated between DNR and Modine.

DNR and city officials believe the chemical was probably spilled more than a decade ago by Modine's predecessor. The plant is located across from the Mulberry Street well which, up until now, has supplied most of the city's water.

Modine contends the chemical has never been used in the manufacturing process at the Camdenton plant.

Increased levels of TCE have been showing up in the city's water system over the last year. Traces started appearing as early as last summer. Since that time, city officials have determined the contamination was entering the water supply at the Mulberry Street well.

The city is in the process of putting together a deal for a new well on Hickory Street. The well, property and engineering is expected to run the city about $250,000. In the meantime, the Mulberry Street well is being used as little as possible, according to Public Works Director Vince Costa.

TCE is considered to be a human carcinogen by the International Agency for Research on cancer and the Environmental Protection Agency, depending on levels of exposure, duration and amounts.

DNR engineer Chris Kump said the consent order is the first step in the process of determining the nature and extent of the TCE contamination. Based on what is found, clean-up measures may be recommended.

"The order requires Modine to determine the nature and extent of contamination, including groundwater, resulting from past waste handling practices at the facility," DNR spokesman Connie Patterson said "The order also requires Modine to perform a corrective measure study and detail a final remedy to be applied at the site. The public will be asked for review and comment on the proposed final remedy prior to approval by DNR and implementation by Modine"

TCE is considered to be a human carcinogen by the International Agency for Research on cancer and the Environmental Protection Agency, depending on levels of exposure, duration and amounts.

Modine Manufacturing Company has operated the Camdenton facility since October, 1990. Modine manufactures air-conditioning coils and feeder parts from aluminum and copper tubing. The facility was previously owned by Sunstrand Tubular Products from 1974 to 1990.

Kump said Modine has been very willing to work with DNR to get the TCE problem corrected.

Former Hulett Lagoon Site
Combined PA/SI
R Reference 52

MAY 2 1 1998

HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

RCRA Sampling Investigation Report

Modine Site - Burnau Private Well
Camdenton, Missouri

April 23, 1998

Prepared For:

Missouri Department of Natural Resources
Division of Environmental Quality
Hazardous Waste Program

Prepared By:

Missouri Department of Natural Resources
Division of Environmental Quality
Environmental Services Program

Table of Contents

Section		Page
1.0	Introduction	1
2.0	Site Description and History	1
	2.1 Site Location	1
	2.2 Site Description	1
	2.3 Site History/Contaminants of Concern	1
3.0	Methods	2
	3.1 Field Procedures	2
	3.2 Chain-of-Custody	2
	3.3 Analyses Requested	3
	3.4 Quality Assurance/Quality Control (QA/QC)	3
4.0	Investigation Derived Wastes	3
5.0	Observations	3
6.0	Data Reporting	3
Appendices		Located at end of report

1.0 Introduction

At the request of the Hazardous Waste Program (HWP) a sampling investigation was conducted on April 23, 1998, by Eric Sappington of the Environmental Services Program (ESP). The purpose of the investigation was to collect a water sample from a private well located at the Dave Burnau residence, 178 Sunset Drive in Camdenton, Missouri. The Burnau home is located across the street from the Modine Heat Transfer, Inc. facility. Information obtained from previous investigations raised concerns that organic solvent contaminants, known to exist in the soils and groundwater at the Modine site, may have migrated to the nearby Burnau well.

The private well at the Burnau residence is a secondary water source, the primary drinking water source being the Camdenton public water supply. There were no samples collected from the Camdenton public water supply during this investigation.

2.0 Site Description and History

2.1 Site Location

The Burnau residence is located at 178 Sunset Drive, Camdenton, Missouri. The Modine Heat Transfer, Inc. facility is located at 179 Sunset Drive, directly across the street from the Burnau residence.

2.2 Site Description

The Burnau home is located in a residential neighborhood adajcent to the Modine facility.

2.3 Site History/Contaminants of Concern

Previous investigations conducted at the Modine site found evidence of organic solvent contamination in both soils and groundwater in the vicinity of the manufacturing plant. Trichloroethylene (trichloroethene), tetrachloroethylene, 1,1,1-trichloroethane, and vinyl chloride are among the contaminants that have been detected in the soils and/or groundwater at the site.

Further historical or background information regarding the Modine site can be found in the ESP and HWP files.

3.0 Methods

3.1 Field Procedures

Sample 98-4702 was collected from an outside spigot located at the rear of the Burnau residence. Sample 98-4703 was collected from the same location as a duplicate to 98-4702. Prior to sample collection, the spigot was turned on and allowed to flow for 12 minutes in order to purge the stagnant water from the pressure tank. According to Mr. Burnau, the pressure tank has a capacity of 30 to 40 gallons. Using a stop watch and a graduated bucket, the flow rate was calculated at four gallons per minute. Thus, 48 gallons were purged prior to sample collection. The water was discharged into a storm drain on the Burnau property.

In order to minimize agitation and aeration at the spigot, the flow rate was reduced to a thin stream for sample collection. The vials for volatile organic parameters were filled first, then the flow rate was increased slightly to facilitate filling the one-liter sample containers for semi-volatile organic parameters.

The sample vials for the volatile organic parameters were pre-preserved with a few drops of hydrochloric acid. The containers for semi-volatile organic parameters required no chemical preservatives. Upon collection, all sample containers were labelled and placed immediately on ice in a cooler.

Clean nitrile gloves were worn for sample collection.

Modine was contacted prior to the investigation and offered the opportunity to collect split samples from the Burnau well. The company was initially interested in collecting samples, but then declined the offer.

3.2 Chain-of-Custody

Each sample container received a numbered label upon collection. A chain-of-custody form was then completed which recorded the sample number assigned to each container, the description of the location of the sample collected, the date and time collected, and the parameters to be analyzed.

The ESP representative maintained custody of the samples and hand delivered the samples to the Environmental Services Program in Jefferson City where they were relinquished to a sample custodian.

3.3 Analyses Requested

All samples were analyzed for volatile organic and semi-volatile organic parameters.

3.4 Quality Assurance/Quality Control (QA/QC)

All samples were analyzed in accordance with the general requirements and standard operating procedures described in the Fiscal Year 1998 Generator/TSD Quality Assurance Project Plan.

Sample 98-4701 was collected as a trip blank and analyzed for the same parameters as the groundwater samples.

4.0 Investigation Derived Wastes

All disposable personal protective equipment generated by the ESP representative was returned to the ESP laboratory for proper disposal.

5.0 Observations

The samples collected from the Burnau private well were clear, colorless and had no discernable odor.

When asked at the time of the investigation, Mr. Burnau was not aware of the well characteristics (e.g. total well depth, static water level, casing depth, or depth of pump). The ESP did not open up the well and made no attempt to measure the well characteristics.

Mr. Burnau stated that he used the private well primarily for watering his lawn and that he did not use the well as a source of drinking water. There was nothing unusual noted regarding the lawn and there were no obvious signs of stressed vegetation observed.

The weather on the day of sampling was sunny and warm.

6.0 Data Reporting

The analytical results of the sampling investigation are attached to this report.

In response to a request made by Mr. Burnau at the time of the investigation, Eric Sappington provided the sample results to Mr. Burnau during a telephone conversation that took place on May 18, 1998. Mr. Burnau was informed that the level of trichloroethene (TCE) in his private well exceeded the Maximum Contaminant Level (MCL) for public drinking water supplies. The MCL for TCE is 5 parts per billion (ug/L). Mr. Burnau was advised not to drink the water and was provided with a contact at the Missouri Department of Health (Randy Maley) should he have any questions regarding the health effects of TCE.

Submitted by: Eric Sappington

Eric Sappington
Environmental Specialist
Field Services Section
Environmental Services Program

Date: 5/20/98

Approved by:

James H. Long
Director
Environmental Services Program

ES:

c: Chris Kump, HWP
Bob Hentges, Regional Director, JCRO

Appendix A

RCRA Sampling Investigation Report
Modine Site - Burnau Private Well
Camdenton, Missouri
April 23, 1998

Analytical Results

STATE OF MISSOURI
Mel Carnahan, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 98-4701
Lab Number: 98-D933

Reported To: ERIC SAPPINGTON
Affiliation: ESP
Project Code: 3735/3000

Report Date: 5/ 6/98
Date Collected: 4/23/98
Date Received: 4/24/98

Sample Collected by: ERIC SAPPINGTON, ESP
Sampling Location: MODINE SITE, CAMDENTON, MO,
Sample Description: TRIP BLANKS

Analysis Performed	Results		Analyzed	Method
VOA Results:				
Chloromethane	< 5.0	ug/L	4/28/98	8260
Vinyl Chloride	< 5.0	ug/L	4/28/98	8260
Bromomethane	< 5.0	ug/L	4/28/98	8260
Chloroethane	< 5.0	ug/L	4/28/98	8260
1,1-Dichloroethene	< 5.0	ug/L	4/28/98	8260
Acetone	< 20.0	ug/L	4/28/98	8260
Carbon Disulfide	< 5.0	ug/L	4/28/98	8260
Methylene Chloride	< 20.0	ug/L	4/28/98	8260
Methyl Tert-Butyl Ether	< 5.0	ug/L	4/28/98	8260
trans-1,2-Dichloroethene	< 5.0	ug/L	4/28/98	8260
1,1-Dichloroethane	< 5.0	ug/L	4/28/98	8260
2-Butanone	< 20.0	ug/L	4/28/98	8260
cis-1,2-Dichloroethene	< 5.0	ug/L	4/28/98	8260
Chloroform	< 5.0	ug/L	4/28/98	8260
1,1,1-Trichloroethane	< 5.0	ug/L	4/28/98	8260
Carbon Tetrachloride	< 5.0	ug/L	4/28/98	8260
Benzene	< 5.0	ug/L	4/28/98	8260
1,2-Dichloroethane	< 5.0	ug/L	4/28/98	8260
Trichloroethene	< 5.0	ug/L	4/28/98	8260
1,2-Dichloropropane	< 5.0	ug/L	4/28/98	8260
Bromodichloromethane	< 5.0	ug/L	4/28/98	8260
2-Hexanone	< 20.0	ug/L	4/28/98	8260
Trans-1,3-Dichloropropene	< 5.0	ug/L	4/28/98	8260
Toluene	< 5.0	ug/L	4/28/98	8260
CIS-1,3-Dichloropropene	< 5.0	ug/L	4/28/98	8260

RECYCLED PAPER

Analysis Performed	Results		Analyzed	Method
1,1,2-Trichloroethane	< 5.0	ug/L	4/28/98	8260
4-Methyl-2-Pentanone	< 20.0	ug/L	4/28/98	8260
Tetrachloroethene	< 5.0	ug/L	4/28/98	8260
Dibromochloromethane	< 5.0	ug/L	4/28/98	8260
Chlorobenzene	< 5.0	ug/L	4/28/98	8260
Ethylbenzene	< 5.0	ug/L	4/28/98	8260
Total Xylenes	< 5.0	ug/L	4/28/98	8260
Styrene	< 5.0	ug/L	4/28/98	8260
Bromoform	< 5.0	ug/L	4/28/98	8260
1,1,2,2-Tetrachloroethane	< 5.0	ug/L	4/28/98	8260
1,3-Dichlorobenzene	< 5.0	ug/L	4/28/98	8260
1,4-Dichlorobenzene	< 5.0	ug/L	4/28/98	8260
1,2-Dichlorobenzene	< 5.0	ug/L	4/28/98	8260
BNA Results:				
Phenol	< 2.0	ug/L	4/30/98	8270
bis(-2-Chloroethyl)Ether	< 2.0	ug/L	4/30/98	8270
2-Chlorophenol	< 5.0	ug/L	4/30/98	8270
1,3-Dichlorobenzene	< 2.0	ug/L	4/30/98	8270
1,4-Dichlorobenzene	< 2.0	ug/L	4/30/98	8270
N-nitrosodimethylamine	< 2.0	ug/L	4/30/98	8270
1,2-Dichlorobenzene	< 2.0	ug/L	4/30/98	8270
2-Methylphenol	< 2.0	ug/L	4/30/98	8270
bis(2-Chloroisopropyl)Eth	< 2.0	ug/L	4/30/98	8270
4-Methylphenol	< 2.0	ug/L	4/30/98	8270
N-Nitro-Di-n-Propylamine	< 2.0	ug/L	4/30/98	8270
Hexachloroethane	< 2.0	ug/L	4/30/98	8270
Nitrobenzene	< 2.0	ug/L	4/30/98	8270
Isophorone	< 2.0	ug/L	4/30/98	8270
2-Nitrophenol	< 2.0	ug/L	4/30/98	8270
2,4-Dimethylphenol	< 2.0	ug/L	4/30/98	8270
Benzoic Acid	< 2.0	ug/L	4/30/98	8270
bis(2-Chloroethoxy)Methan	< 2.0	ug/L	4/30/98	8270
2,4-Dichlorophenol	< 2.0	ug/L	4/30/98	8270
1,2,4-Trichlorobenzene	< 2.0	ug/L	4/30/98	8270
Naphthalene	< 2.0	ug/L	4/30/98	8270
4-Chloroaniline	< 5.0	ug/L	4/30/98	8270
Hexachlorobutadiene	< 2.0	ug/L	4/30/98	8270
4-Chloro-3-Methylphenol	< 5.0	ug/L	4/30/98	8270
2-Methylnaphthalene	< 2.0	ug/L	4/30/98	8270
Hexachlorocyclopentadiene	< 2.0	ug/L	4/30/98	8270
2,4,6-Trichlorophenol	< 2.0	ug/L	4/30/98	8270
2,4,5-Trichlorophenol	< 5.0	ug/L	4/30/98	8270
2-Chloronaphthalene	< 2.0	ug/L	4/30/98	8270
2-Nitroaniline	< 5.0	ug/L	4/30/98	8270
Dimethylphthalate	< 2.0	ug/L	4/30/98	8270
Acenaphthylene	< 2.0	ug/L	4/30/98	8270
2,6-Dinitrotoluene	< 2.0	ug/L	4/30/98	8270
3-Nitroaniline	< 5.0	ug/L	4/30/98	8270

Analysis Performed	Results		Analyzed	Method
Acenaphthene	< 2.0	ug/L	4/30/98	8270
2,4-Dinitrophenol	< 5.0	ug/L	4/30/98	8270
4-Nitrophenol	< 5.0	ug/L	4/30/98	8270
Dibenzofuran	< 2.0	ug/L	4/30/98	8270
2,4-Dinitrotoluene	< 2.0	ug/L	4/30/98	8270
Diethylphthalate	< 2.0	ug/L	4/30/98	8270
4-Chlorophenyl-phenylethe	< 2.0	ug/L	4/30/98	8270
Fluorene	< 2.0	ug/L	4/30/98	8270
4-Nitroaniline	< 5.0	ug/L	4/30/98	8270
4,6-Dinitro-2-Methylpheno	< 5.0	ug/L	4/30/98	8270
N-Nitrosodiphenylamine	< 2.0	ug/L	4/30/98	8270
4-Bromophenyl-phenylether	< 2.0	ug/L	4/30/98	8270
Hexachlorobenzene	< 2.0	ug/L	4/30/98	8270
Pentachlorophenol	< 5.0	ug/L	4/30/98	8270
Phenanthrene	< 2.0	ug/L	4/30/98	8270
Anthrancene	< 2.0	ug/L	4/30/98	8270
Di-n-Butylphthalate	< 5.0	ug/L	4/30/98	8270
Fluoranthene	< 2.0	ug/L	4/30/98	8270
Pyrene	< 2.0	ug/L	4/30/98	8270
Butylbenzylphthalate	< 2.0	ug/L	4/30/98	8270
3-3'-Dichlorobenzidine	< 5.0	ug/L	4/30/98	8270
Benzo(a)anthracene	< 2.0	ug/L	4/30/98	8270
Chrysene	< 2.0	ug/L	4/30/98	8270
bis(2-ethylhexyl)phthalat	< 5.0	ug/L	4/30/98	8270
Di-n-Octylphthalate	< 2.0	ug/L	4/30/98	8270
Benzo(b)fluoranthene	< 2.0	ug/L	4/30/98	8270
Benzo(k)fluoranthene	< 2.0	ug/L	4/30/98	8270
Benzo(a)pyrene	< 2.0	ug/L	4/30/98	8270
Indeno(1,2,3-cd)pyrene	< 2.0	ug/L	4/30/98	8270
Dibenz(a,h)anthracene	< 2.0	ug/L	4/30/98	8270
Benzo(g,h,i)perylene	< 2.0	ug/L	4/30/98	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: KATHY FLIPPIN, HWP

STATE OF MISSOURI Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P O Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 98-4702
Lab Number: 98-D935

Reported To: ERIC SAPPINGTON
Affiliation: ESP
Project Code: 3735/3000

Report Date: 5/ 6/98
Date Collected: 4/23/98
Date Received: 4/24/98

Sample Collected by: ERIC SAPPINGTON, ESP
Sampling Location: MODINE SITE, CAMDENTON, MO,
Sample Description: BURNAU RESIDENCE, GROUNDWATER, PRIVATE WELL

Analysis Performed	Results		Analyzed	Method
VOA Results:				
Chloromethane	< 5.0	ug/L	4/28/98	8260
Vinyl Chloride	< 5.0	ug/L	4/28/98	8260
Bromomethane	< 5.0	ug/L	4/28/98	8260
Chloroethane	< 5.0	ug/L	4/28/98	8260
1,1-Dichloroethene	< 5.0	ug/L	4/28/98	8260
Acetone	< 20.0	ug/L	4/28/98	8260
Carbon Disulfide	< 5.0	ug/L	4/28/98	8260
Methylene Chloride	< 20.0	ug/L	4/28/98	8260
Methyl Tert-Butyl Ether	< 5.0	ug/L	4/28/98	8260
trans-1,2-Dichloroethene	< 5.0	ug/L	4/28/98	8260
1,1-Dichloroethane	< 5.0	ug/L	4/28/98	8260
2-Butanone	< 20.0	ug/L	4/28/98	8260
cis-1,2-Dichloroethene	12.0	ug/L	4/28/98	8260
Chloroform	< 5.0	ug/L	4/28/98	8260
1,1,1-Trichloroethane	< 5.0	ug/L	4/28/98	8260
Carbon Tetrachloride	< 5.0	ug/L	4/28/98	8260
Benzene	< 5.0	ug/L	4/28/98	8260
1,2-Dichloroethane	< 5.0	ug/L	4/28/98	8260
Trichloroethene	210	ug/L	4/28/98	8260
1,2-Dichloropropane	< 5.0	ug/L	4/28/98	8260
Bromodichloromethane	< 5.0	ug/L	4/28/98	8260
2-Hexanone	< 20.0	ug/L	4/28/98	8260
Trans-1,3-Dichloropropene	< 5.0	ug/L	4/28/98	8260
Toluene	< 5.0	ug/L	4/28/98	8260

RECYCLED PAPER

Analysis Performed	Results		Analyzed	Method
CIS-1,3-Dichloropropene	< 5.0	ug/L	4/28/98	8260
1,1,2-Trichloroethane	< 5.0	ug/L	4/28/98	8260
4-Methyl-2-Pentanone	< 20.0	ug/L	4/28/98	8260
Tetrachloroethene	< 5.0	ug/L	4/28/98	8260
Dibromochloromethane	< 5.0	ug/L	4/28/98	8260
Chlorobenzene	< 5.0	ug/L	4/28/98	8260
Ethylbenzene	< 5.0	ug/L	4/28/98	8260
Total Xylenes	< 5.0	ug/L	4/28/98	8260
Styrene	< 5.0	ug/L	4/28/98	8260
Bromoform	< 5.0	ug/L	4/28/98	8260
1,1,2,2-Tetrachloroethane	< 5.0	ug/L	4/28/98	8260
1,3-Dichlorobenzene	< 5.0	ug/L	4/28/98	8260
1,4-Dichlorobenzene	< 5.0	ug/L	4/28/98	8260
1,2-Dichlorobenzene	< 5.0	ug/L	4/28/98	8260
BNA Results:				
Phenol	< 2.0	ug/L	4/30/98	8270
bis(-2-Chloroethyl)Ether	< 2.0	ug/L	4/30/98	8270
2-Chlorophenol	< 5.0	ug/L	4/30/98	8270
1,3-Dichlorobenzene	< 2.0	ug/L	4/30/98	8270
1,4-Dichlorobenzene	< 2.0	ug/L	4/30/98	8270
N-nitrosodimethylamine	< 2.0	ug/L	4/30/98	8270
1,2-Dichlorobenzene	< 2.0	ug/L	4/30/98	8270
2-Methylphenol	< 2.0	ug/L	4/30/98	8270
bis(2-Chloroisopropyl)Eth	< 2.0	ug/L	4/30/98	8270
4-Methylphenol	< 2.0	ug/L	4/30/98	8270
N-Nitro-Di-n-Propylamine	< 2.0	ug/L	4/30/98	8270
Hexachloroethane	< 2.0	ug/L	4/30/98	8270
Nitrobenzene	< 2.0	ug/L	4/30/98	8270
Isophorone	< 2.0	ug/L	4/30/98	8270
2-Nitrophenol	< 2.0	ug/L	4/30/98	8270
2,4-Dimethylphenol	< 2.0	ug/L	4/30/98	8270
Benzoic Acid	< 2.0	ug/L	4/30/98	8270
bis(2-Chloroethoxy)Methan	< 2.0	ug/L	4/30/98	8270
2,4-Dichlorophenol	< 2.0	ug/L	4/30/98	8270
1,2,4-Trichlorobenzene	< 2.0	ug/L	4/30/98	8270
Naphthalene	< 2.0	ug/L	4/30/98	8270
4-Chloroaniline	< 5.0	ug/L	4/30/98	8270
Hexachlorobutadiene	< 2.0	ug/L	4/30/98	8270
4-Chloro-3-Methylphenol	< 5.0	ug/L	4/30/98	8270
2-Methylnaphthalene	< 2.0	ug/L	4/30/98	8270
Hexachlorocyclopentadiene	< 2.0	ug/L	4/30/98	8270
2,4,6-Trichlorophenol	< 2.0	ug/L	4/30/98	8270
2,4,5-Trichlorophenol	< 5.0	ug/L	4/30/98	8270
2-Chloronaphthalene	< 2.0	ug/L	4/30/98	8270
2-Nitroaniline	< 5.0	ug/L	4/30/98	8270
Dimethylphthalate	< 2.0	ug/L	4/30/98	8270
Acenaphthylene	< 2.0	ug/L	4/30/98	8270
2,6-Dinitrotoluene	< 2.0	ug/L	4/30/98	8270

Analysis Performed	Results		Analyzed	Method
3-Nitroaniline	< 5.0	ug/L	4/30/98	8270
Acenaphthene	< 2.0	ug/L	4/30/98	8270
2,4-Dinitrophenol	< 5.0	ug/L	4/30/98	8270
4-Nitrophenol	< 5.0	ug/L	4/30/98	8270
Dibenzofuran	< 2.0	ug/L	4/30/98	8270
2,4-Dinitrotoluene	< 2.0	ug/L	4/30/98	8270
Diethylphthalate	< 2.0	ug/L	4/30/98	8270
4-Chlorophenyl-phenylethe	< 2.0	ug/L	4/30/98	8270
Fluorene	< 2.0	ug/L	4/30/98	8270
4-Nitroaniline	< 5.0	ug/L	4/30/98	8270
4,6-Dinitro-2-Methylpheno	< 5.0	ug/L	4/30/98	8270
N-Nitrosodiphenylamine	< 2.0	ug/L	4/30/98	8270
4-Bromophenyl-phenylether	< 2.0	ug/L	4/30/98	8270
Hexachlorobenzene	< 2.0	ug/L	4/30/98	8270
Pentachlorophenol	< 5.0	ug/L	4/30/98	8270
Phenanthrene	< 2.0	ug/L	4/30/98	8270
Anthrancene	< 2.0	ug/L	4/30/98	8270
Di-n-Butylphthalate	< 5.0	ug/L	4/30/98	8270
Fluoranthene	< 2.0	ug/L	4/30/98	8270
Pyrene	< 2.0	ug/L	4/30/98	8270
Butylbenzylphthalate	< 2.0	ug/L	4/30/98	8270
3-3'-Dichlorobenzidine	< 5.0	ug/L	4/30/98	8270
Benzo(a)anthracene	< 2.0	ug/L	4/30/98	8270
Chrysene	< 2.0	ug/L	4/30/98	8270
bis(2-ethylhexyl)phthalat	< 5.0	ug/L	4/30/98	8270
Di-n-Octylphthalate	< 2.0	ug/L	4/30/98	8270
Benzo(b)fluoranthene	< 2.0	ug/L	4/30/98	8270
Benzo(k)fluoranthene	< 2.0	ug/L	4/30/98	8270
Benzo(a)pyrene	< 2.0	ug/L	4/30/98	8270
Indeno(1,2,3-cd)pyrene	< 2.0	ug/L	4/30/98	8270
Dibenz(a,h)anthracene	< 2.0	ug/L	4/30/98	8270
Benzo(g,h,i)perylene	< 2.0	ug/L	4/30/98	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: KATHY FLIPPIN, HWP

STATE OF MISSOURI
Mel Carnahan Governor • Stephen M. Mahfood Director
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

ENVIRONMENTAL SERVICES PROGRAM

RESULTS OF SAMPLE ANALYSES

Sample Number: 98-4703
Lab Number: 98-D936

Reported To: ERIC SAPPINGTON
Affiliation: ESP
Project Code: 3735/3000

Report Date: 5/13/98
Date Collected: 4/23/98
Date Received: 4/24/98

Sample Collected by: ERIC SAPPINGTON, ESP
Sampling Location: MODINE SITE, CAMDENTON, MO,
Sample Description: BURNAU RESIDENCE, GROUNDWATER, PRIVATE WELL (DUPLICATE)

Analysis Performed	Results		Analyzed	Method
VOA Results:				
Chloromethane	< 5.0	ug/L	4/29/98	8260
Vinyl Chloride	< 5.0	ug/L	4/29/98	8260
Bromomethane	< 5.0	ug/L	4/29/98	8260
Chloroethane	< 5.0	ug/L	4/29/98	8260
1,1-Dichloroethene	< 5.0	ug/L	4/29/98	8260
Acetone	< 20.0	ug/L	4/29/98	8260
Carbon Disulfide	< 5.0	ug/L	4/29/98	8260
Methylene Chloride	< 20.0	ug/L	4/29/98	8260
Methyl Tert-Butyl Ether	< 5.0	ug/L	4/29/98	8260
trans-1,2-Dichloroethene	< 5.0	ug/L	4/29/98	8260
1,1-Dichloroethane	< 5.0	ug/L	4/29/98	8260
2-Butanone	< 20.0	ug/L	4/29/98	8260
cis-1,2-Dichloroethene	13.0	ug/L	4/29/98	8260
Chloroform	< 5.0	ug/L	4/29/98	8260
1,1,1-Trichloroethane	< 5.0	ug/L	4/29/98	8260
Carbon Tetrachloride	< 5.0	ug/L	4/29/98	8260
Benzene	< 5.0	ug/L	4/29/98	8260
1,2-Dichloroethane	< 5.0	ug/L	4/29/98	8260
Trichloroethene	170	ug/L	4/29/98	8260
1,2-Dichloropropane	< 5.0	ug/L	4/29/98	8260
Bromodichloromethane	< 5.0	ug/L	4/29/98	8260
2-Hexanone	< 20.0	ug/L	4/29/98	8260
Trans-1,3-Dichloropropene	< 5.0	ug/L	4/29/98	8260
Toluene	< 5.0	ug/L	4/29/98	8260

RECYCLED PAPER

Analysis Performed	Results		Analyzed	Method
CIS-1,3-Dichloropropene	< 5.0	ug/L	4/29/98	8260
1,1,2-Trichloroethane	< 5.0	ug/L	4/29/98	8260
4-Methyl-2-Pentanone	< 20.0	ug/L	4/29/98	8260
Tetrachloroethene	< 5.0	ug/L	4/29/98	8260
Dibromochloromethane	< 5.0	ug/L	4/29/98	8260
Chlorobenzene	< 5.0	ug/L	4/29/98	8260
Ethylbenzene	< 5.0	ug/L	4/29/98	8260
Total Xylenes	< 5.0	ug/L	4/29/98	8260
Styrene	< 5.0	ug/L	4/29/98	8260
Bromoform	< 5.0	ug/L	4/29/98	8260
1,1,2,2-Tetrachloroethane	< 5.0	ug/L	4/29/98	8260
1,3-Dichlorobenzene	< 5.0	ug/L	4/29/98	8260
1,4-Dichlorobenzene	< 5.0	ug/L	4/29/98	8260
1,2-Dichlorobenzene	< 5.0	ug/L	4/29/98	8260
BNA Results:				
Phenol	< 2.0	ug/L	4/30/98	8270
bis(-2-Chloroethyl)Ether	< 2.0	ug/L	4/30/98	8270
2-Chlorophenol	< 5.0	ug/L	4/30/98	8270
1,3-Dichlorobenzene	< 2.0	ug/L	4/30/98	8270
1,4-Dichlorobenzene	< 2.0	ug/L	4/30/98	8270
N-nitrosodimethylamine	< 2.0	ug/L	4/30/98	8270
1,2-Dichlorobenzene	< 2.0	ug/L	4/30/98	8270
2-Methylphenol	< 2.0	ug/L	4/30/98	8270
bis(2-Chloroisopropyl)Eth	< 2.0	ug/L	4/30/98	8270
4-Methylphenol	< 2.0	ug/L	4/30/98	8270
N-Nitro-Di-n-Propylamine	< 2.0	ug/L	4/30/98	8270
Hexachloroethane	< 2.0	ug/L	4/30/98	8270
Nitrobenzene	< 2.0	ug/L	4/30/98	8270
Isophorone	< 2.0	ug/L	4/30/98	8270
2-Nitrophenol	< 2.0	ug/L	4/30/98	8270
2,4-Dimethylphenol	< 2.0	ug/L	4/30/98	8270
Benzoic Acid	< 2.0	ug/L	4/30/98	8270
bis(2-Chloroethoxy)Methan	< 2.0	ug/L	4/30/98	8270
2,4-Dichlorophenol	< 2.0	ug/L	4/30/98	8270
1,2,4-Trichlorobenzene	< 2.0	ug/L	4/30/98	8270
Naphthalene	< 2.0	ug/L	4/30/98	8270
4-Chloroaniline	< 5.0	ug/L	4/30/98	8270
Hexachlorobutadiene	< 2.0	ug/L	4/30/98	8270
4-Chloro-3-Methylphenol	< 5.0	ug/L	4/30/98	8270
2-Methylnaphthalene	< 2.0	ug/L	4/30/98	8270
Hexachlorocyclopentadiene	< 2.0	ug/L	4/30/98	8270
2,4,6-Trichlorophenol	< 2.0	ug/L	4/30/98	8270
2,4,5-Trichlorophenol	< 5.0	ug/L	4/30/98	8270
2-Chloronaphthalene	< 2.0	ug/L	4/30/98	8270
2-Nitroaniline	< 5.0	ug/L	4/30/98	8270
Dimethylphthalate	< 2.0	ug/L	4/30/98	8270
Acenaphthylene	< 2.0	ug/L	4/30/98	8270
2,6-Dinitrotoluene	< 2.0	ug/L	4/30/98	8270

Analysis Performed	Results		Analyzed	Method
3-Nitroaniline	< 5.0	ug/L	4/30/98	8270
Acenaphthene	< 2.0	ug/L	4/30/98	8270
2,4-Dinitrophenol	< 5.0	ug/L	4/30/98	8270
4-Nitrophenol	< 5.0	ug/L	4/30/98	8270
Dibenzofuran	< 2.0	ug/L	4/30/98	8270
2,4-Dinitrotoluene	< 2.0	ug/L	4/30/98	8270
Diethylphthalate	< 2.0	ug/L	4/30/98	8270
4-Chlorophenyl-phenylethe	< 2.0	ug/L	4/30/98	8270
Fluorene	< 2.0	ug/L	4/30/98	8270
4-Nitroaniline	< 5.0	ug/L	4/30/98	8270
4,6-Dinitro-2-Methylpheno	< 5.0	ug/L	4/30/98	8270
N-Nitrosodiphenylamine	< 2.0	ug/L	4/30/98	8270
4-Bromophenyl-phenylether	< 2.0	ug/L	4/30/98	8270
Hexachlorobenzene	< 2.0	ug/L	4/30/98	8270
Pentachlorophenol	< 5.0	ug/L	4/30/98	8270
Phenanthrene	< 2.0	ug/L	4/30/98	8270
Anthrancene	< 2.0	ug/L	4/30/98	8270
Di-n-Butylphthalate	< 5.0	ug/L	4/30/98	8270
Fluoranthene	< 2.0	ug/L	4/30/98	8270
Pyrene	< 2.0	ug/L	4/30/98	8270
Butylbenzylphthalate	< 2.0	ug/L	4/30/98	8270
3-3'-Dichlorobenzidine	< 5.0	ug/L	4/30/98	8270
Benzo(a)anthracene	< 2.0	ug/L	4/30/98	8270
Chrysene	< 2.0	ug/L	4/30/98	8270
bis(2-ethylhexyl)phthalat	< 5.0	ug/L	4/30/98	8270
Di-n-Octylphthalate	< 2.0	ug/L	4/30/98	8270
Benzo(b)fluoranthene	< 2.0	ug/L	4/30/98	8270
Benzo(k)fluoranthene	< 2.0	ug/L	4/30/98	8270
Benzo(a)pyrene	< 2.0	ug/L	4/30/98	8270
Indeno(1,2,3-cd)pyrene	< 2.0	ug/L	4/30/98	8270
Dibenz(a,h)anthracene	< 2.0	ug/L	4/30/98	8270
Benzo(g,h,i)perylene	< 2.0	ug/L	4/30/98	8270

The analysis of this sample was performed in accordance with procedures approved or recognized by the U.S. Environmental Protection Agency.

James H. Long, Director
Environmental Services Program
Division of Environmental Quality

c: KATHY FLIPPIN, HWP

Former Hulett Lagoon Site
Combined PA/SI
Reference 53

JOHN ASHCROFT
Governor

Acting Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGY AND LAND SURVEY
P.O Box 250 111 Fairgrounds Rd. Rolla, MO 65401

MONITORING WELL INSTALLATION FOR SUNDSTRAND PA/SI

On July 22-29, 1992, two monitoring wells were drilled at the Sundstrand site in Camdenton. This site is located in Section 26, T. 38 N., R. 17 W., in Camden County. These two wells are an upgradient well and a downgradient well for the site. Both monitor the water table which was encountered at depths of 160 to 175 feet. The locations of these wells are indicated on an attached map.

In the downgradient well, bedrock was encountered at a much greater depth than anticipated, and nominal 8 inch steel surfacing casing was installed to a depth of 94 feet. This casing was grouted full length with a 2% CaCl cement. No surface casing was used in the upgradient well. Both wells are completed in the Gasconade Dolomite.

In both wells schedule 80 PVC screen with a size 10 slot, 12-20 sand, and 2" schedule 40 PVC riser pipe was used.

Edith Starbuck, Geologist
Environmental Geology Section
Geology & Land Survey
August 7, 1992

ES/dsb

Post-it® Fax Note 7671	Date 11-9-94	# of pages ▶ 4
To Jim Tucholski	From Edie Starbuck	
Co./Dept. H.W.P. - DEQ	Co DGLS - Rolla	
Phone # 314-751-2674	Phone # 314-368-2136	
Fax # 314-751-7869	Fax # 314-368-2111	

Missouri State Parks 75th Anniversary
Recycled Paper

MW-2

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Sundstrand PA/SI, Camdenton

PAGE NO.: of

HOLE NO.: MW-2

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
7/28	7/29	Layne	air rotary	8¼"	2"	19 –

LOGGER	TOP OF CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
Starbuck		approx. [illegible]	176, 7/29/92 (Possibly no. fully recharged

upgradient - inside fenced area, east of building

SAMPLE NO.	SAMPLE TYPE	RECOVERY *	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION SAMPLE INTERVAL	DESCRIPTION	NOTES
					12				fill material to about 5', thin sandstones in sandy red clay with chert	
					24'				much chert.	
					37'				medium gray dolomite with chert, often sandy	
					123					slightly moist cutting
					145					w.l. 176'
					157					v. wet @ 196'
					197					2' seal, 52' sand, 40' screen

Aug 9 1995 159.53 below T.O.C.

*ASTM D1586
SS = SPLIT SPOON
D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
HA = HUCKET AUG.

PAGE NO. of HOLE NO.

FIGURE 3-1
FIELD DRILL LOG

Not to scale

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Sundstrand PA/SI, Camdenton

PAGE NO.: of

HOLE NO.:

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
7/28	7/29	Layne	air rotary	8¼"	2"	197

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
Starbuck		approx. ~~950~~ 940'	176, 7/29/92 (possibly not fully recharged)

upgradient - inside fenced area, east of building

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					12					fill material to about 5', thin sandstones in sandy red clay with chert	
					24'					much chert	
					37'					medium gray dolomite with chert, often sandy	
					123						slightly moist cutting
					197						v. wet @ 196'
											2' seal, 52' sand, 40' screen

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS BA = BUCKET AUG.

PAGE NO.: of

HOLE NO.:

FIGURE 3-1
FIELD DRILL LOG

WCI -

when cement will be ready

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Sundstrand, Camdenton MO

PAGE NO. of | HOLE NO. up

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
7/28	7/29					

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
			176 - 7/29/92

schd 40 pipe, schd 80 screen 10 slot (40') 12-20 sand (16 bags)

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					0'					poor samples - encountering gravel ca (1:11?)	
					5'					"	
					10-12					~16" of dense red clay above 8" of poorly consolidated sand (red stain) fine - frosted - poorly rounded	
					15'-14'					sandy clay, ~2" sand, broken dk gray chert	
					20-22					somewhat sandy dense red clay w/2" sandy dolomite	
					24'					lots of chert - gray white	
					30'					chert & some dolo - little sandy.	damp
						37'				"good bedrock"	
					40'					lt gray dolo - some dk gr chert some clayey seams	frequent clay seams
					50					lt gray micro xln dolomite	
					60					"	
										" some med gray chert	
					70					"	
					80					lt gray fine xln dolomite	
					90					tan-gray dolomite - little gray chert	
					100					med gray sandy dolomite - little wht chert	
					110					tan gray " " "	
					120					"	moist
					123						~~shell~~ moist
					127					tan-gray dolomite w/ little chert	dry
					132						moisture
					138					" w/ lots of gray chert	slightly moist
					143						
				145'	147					sandy dolomite	" dry
				157'	152					let stand ~ 1 hr - v.v. little water	
					178					buff-colored dolomite	
					183						little moist
					185					" " w/ some chert	
					190						v. wet
					196					v. wet - a respectable amount of water	
					197					T.D	

*ASTM D1586 ST = SHELBY TUBE
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. of | HOLE NO.

Floyd said damp @ ~163'

FIGURE 3-1
FIELD DRILL LOG

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Sundstrand PA/SI, Camdenton | PAGE NO. of | HOLE NO. MW-1

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
7/22	7/27	Layne	air rotary	8½"/12"	2"	178

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
Starbuck		approx ~~970'~~ 950'	161 . 7/28/92

downgradient - 50' west of west parking lot

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					25					silty red clay with chert. the zone from 10-20 had little chert	~~SF~~ Surface casing to 94 feet
					80'					boulders or relict bedding of cherit and dolomite	
					90					much chert	
					100					sandy dolomite with chert	moist cutting ↓
					120					medium gray dolomite with very little chert	w.l. 161'
					178						2' seal 50' sand 40' scree

Aug 9 '95 147.28 bebw T.O.C.

*ASTM D1586 SS = SPLIT SPOON D = DENNISON ST = SHELBY TUBE C = CORE CT = CUTTINGS CS = CONTINUOUS SAMPLER BA = BUCKET AUG.

PAGE NO. of | HOLE NO.

FIGURE 3-1
FIELD DRILL LOG

Not to scale

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Sundstrand PA/SI, Camdenton

PAGE NO. of | HOLE NO.

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
7/22	7/27	Layne	air rotary	8½"/12"	2"	178'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
Starbuck		approx ~~940~~ 950	161 . 7/28/92

downgradient - 50' west of west parking lot

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASSIFICATION SAMPLE INTERVAL	DESCRIPTION	NOTES
					25				silty red clay with chert. the zone from 10-20 had little chert boulders or relict bedding of cherit and dolomite	~~SF~~ surface casing to 94 feet
					80'				much chert	
					90					
					100				sandy dolomite with chert	moist cuttings ↓
					120				medium gray dolomite with very little chert	
					178					2' seal 50' sand 40' screen

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS BA = BUCKET AUG.

PAGE NO. of | HOLE NO.

FIGURE 3-1
FIELD DRILL LOG

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION | PAGE NO. of | HOLE NO down

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
7/22	7/27					178

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
			161' 7/28

50' west and 160' south of NW corner of lot

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
				100						buff color sandy dolomite & chert (H gray)	*
				110						" " less chert	
				120						med gray dolomite w small amt gray chert	
				130						med gray dolomite - no chert	moist
				140						"	
				150						gray dolo - white & gray chert	
				160						" - "	
				170						" "	
				178							total dep

7/27/92 WL = 159'
28 WL = 161'

*ASTM D1586 ST = SHELBY TUBE
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG

PAGE NO. of | HOLE NO

* Dave said - lots of chert in 80 - 94'

FIGURE 3-1
FIELD DRILL LOG

0 tan tred silty clay

5' - ns - silty red clay w/ much chert

5+ stiff red clay w/ small chert fragments

10-12' ~~orig~~ v. stiff red clay w gray chert (flint) and sandy dolomite fragments

15-17' " (chert in 3" zone ~ 16½')

20-20.5' - stiff red clay w/ small ~~on~~ chert fragments

21 - chert

25' - } reject bailing (dolo & chert)
30 } no samples

39' - more rock - tan clay

65' - ~~bedrock~~ rock layer

80' - bedrock

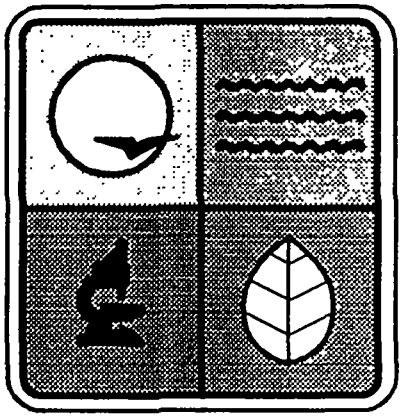
12" hole to 94'

tremie pipe to 85' 2% Ca
> ⅔ of 75 bags

Call Dave

Former Hulett Lagoon Site
Combined PA/SI
Reference 54

COMPREHENSIVE GROUNDWATER MONITORING EVALUATION
MODINE MANUFACTURING COMPANY
CAMDENTON, MISSOURI



Conducted by

MISSOURI DEPARTMENT OF NATURAL RESOURCES
HAZARDOUS WASTE PROGRAM
GROUNDWATER UNIT

CHRIS KUMP
ENVIRONMENTAL ENGINEER

JANUARY, 1998

COMPREHENSIVE MONITORING EVALUATION REPORT

MODINE MANUFACTURING COMPANY

CAMDENTON, MISSOURI

Prepared by

Chris Kump
Environmental Engineer

MDNR HAZARDOUS WASTE PROGRAM

JANUARY, 1998

EXECUTIVE SUMMARY

Modine Manufacturing Company, Camdenton, Missouri produces air-conditioning coils and feeder parts from aluminum and copper tubing. The facility was originally owned and operated by Dawson Metal Products form 1967 to 1974. Sundstrand Tubular products purchased the facility in 1974, and continued operating until 1990. In October 1990 the facility was purchased by Modine Heat Transfer, Inc., now Modine Manufacturing Company. Modine is the current owner/operator of the facility.

Before Modine purchased the facility, Sundstrand submitted a closure plan in September 1990 to terminate interim status and hold generator status only. The closure plan, with approval from MDNR, was implemented in July 1993. Results from the closure plan revealed a release of hazardous waste beneath the facility Therefore, clean closure could not be granted. As a result, Modine became subject to groundwater monitoring requirements contained in 40 CFR 265 Subpart F This included the requirement that a groundwater monitoring system be installed to determine whether groundwater contamination has occurred due to the storage of hazardous waste at the facility.

This Comprehensive Groundwater Monitoring Evaluation (CME) was prepared as part of Missouri's authorization under RCRA, on behalf of EPA and under the Missouri Hazardous Waste Management Law and Regulations to determine the regulatory and technical adequacy of Modine's RCRA groundwater monitoring system. As a result of this evaluation MDNR has determined that:

1 Modine must draft and submit a Sampling and Analysis Plan that adequately defines the sampling procedures to be followed by sampling personnel.

2 The existing groundwater monitoring wells do not adequately determine the rate and extent of groundwater contamination at the facility Therefore, Modine must install additional monitoring wells

3 Modine must submit an annual groundwater monitoring report that documents the sampling results and activities, operation and maintenance of the groundwater monitoring system and the adequacy of the monitoring system at the facility for the year

TABLE OF CONTENTS

I.	**OBJECTIVE AND SCOPE**		1
II.	**SITE DESCRIPTION AND BACKGROUND**		4
	A.	Facility Location	4
	B	Site and Regulatory History	4
	C.	Regulated Unit Description	6
	D.	Compliance History	10
III.	**ENVIRONMENTAL SETTING**		17
	A.	Regional Geology	17
	B.	Site-Specific Geology	21
	C	Site-Specific Hydrogeology	23
IV.	**OPERATION AND MAINTENANCE INSPECTION**		25
	A.	Sampling and Analysis Plan	25
	B.	Field Sampling and Analysis Procedures	30
	C.	Physical Well Integrity Inspection	31
	D.	Split-Sampling Results	32
V.	**TECHNICAL GROUNDWATER MONITORING EVALUATION**		33
	A.	Assessment of Hydrogeological Characterization	33
	B.	Assessment of Monitoring Well Network	34
	C	Annual Groundwater Monitoring Report Content	37
VI.	**CONCLUSIONS**		39
	A.	Sampling and Analysis Plan	39
	B.	Field Sampling and Analysis Procedures	39
	C.	Physical Well Integrity Inspection	40
	D	Split-Sampling Results	41
	E.	Hydrogeological Characterization	41
	F	Assessment of Monitoring Well Network	42
	G.	Annual Groundwater Monitoring Report	43
VII.	**REFERENCES**		44

TABLES INCLUDED IN REPORT TEXT

Table 1	Bedrock Elevation and Thickness	23
Table 2	Monitoring Well Completion Data	35

TABLE OF CONTENTS (CONTINUED)

APPENDICES

Appendix A - Location and Site Maps
Appendix B - Operation and Maintenance Inspection Worksheets
Appendix C - Sampling and Analysis Plan Worksheet
Appendix D - Boring/Monitoring Well Construction Logs
Appendix E - Laboratory Analytical Data
Appendix F - Modine Potentiometric Maps
Appendix G - Annual Groundwater Monitoring Report Review Worksheets
Appendix H - MDNR/Modine Correspondence

TABLE 2

MONITORING WELL COMPLETION DATA

WELL NUMBER	DATE INSTALLED	CASING MATERIAL	CASING DIAMETER	DEPTH TO SCREEN	SCREENED INTERVAL	TOC ELEVATION (bgs)	TOTAL DEPTH (bgs)
MW-1	7/92	PVC	2"	NR	NR	186.61'	161'
MW-2	7/92	PVC	2"	NR	NR	204.26'	197'
MW-3	8/9/95	Steel Surface Casing to 64', Open Hole 64' to 167'	5"* 4-3/4"	None	Open Hole 64' to 167' bgs	193.74'	167'
MW-4	8/11/95	Steel Surface Casing to 44', Open Hole 44' to 158'	5"* 4-3/4"	None	Open Hole 44' to 158' bgs	192.24'	158'

bgs - below ground surface NR - Not Known * - Surface Casing Diameter

Groundwater monitoring wells MW-3 and MW-4, have shown chronic "insufficient well volume" during sampling events. Both wells have shown detectable levels of VOC contamination during past sampling events, and it is not clear why they are chronically dry If Modine cannot obtain samples from these wells, then a remedy must be sought (i e , redevelopment, well replacement, deepening, etc.) to enable collection at these wells

Special consideration should be given to Modine's close proximity (i e., within a 4 mile radius) to at least 130 private and at least 1 public drinking water well It is important that Modine look at the groundwater situation very seriously since any potential groundwater contamination could have a direct affect on the health of groundwater users in the area It is for this reason that additional monitoring wells to define the limits of potential contamination must be installed in a timely manner

Former Hulett Lagoon Site
Combined PA/SI
Reference 55

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

721 Emerson Road, Suite 220
Saint Louis, Missouri 63141-6748
314 993 4599 Tel
314 993 4895 Fax

October 19, 1998

Mr. Thomas S. Sanicola
Environmental Engineer
Modine Manufacturing Company
1500 DeKoven Avenue
Racine, Wisconsin 53403

RECEIVED
OCT 21 1998
HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Re: Final Letter Report
Subsurface Investigation
Monitoring Well Installation - Former Hulett Lagoon
Camdenton, Missouri
Dames & Moore Project No. 27397-035-045

Dear Mr. Sanicola:

Dames & Moore is pleased to submit this letter report summarizing activities relative to the installation of monitoring well MW-5, at the former Hulett Lagoon in Camdenton, Missouri for the Modine Manufacturing Company (Modine). The former Hulett Lagoon is located approximately 1,000 feet northeast of the Modine facility and appears, based upon the results of a previous field fracture survey, to be the source of the observed trichloroethylene (TCE) impact to groundwater. The purpose of this investigation was to determine the presence or absence of volatile organic compounds (VOCs), in particular, TCE in the groundwater underlying the former Hulett Lagoon.

It is our understanding that the Hulett Lagoon is owned and was operated by the City of Camdenton. The lagoon reportedly received wastewater from a number of commercial and industrial facilities; including Sundstrand Tubular Products (Sundstrand), the former owners and operators of the current Modine facility.

The subsurface investigation field activities were conducted from July 7, 1998, through July 16, 1998. A project specific health and safety plan was developed for Dames & Moore personnel and a health and safety briefing was held prior to initiation of the work.

1.0 MONITORING WELL INSTALLATION AND GROUNDWATER SAMPLING

Layne-Western Company, Inc. of St. Louis, Missouri was subcontracted by Dames & Moore for drilling services. The monitoring well was drilled using a truck-mounted hollow stem auger drilling rig and an air rotary drilling rig. Following completion, the monitoring well was

surveyed for location and elevation relative to the existing monitoring wells at the Modine facility by Robert F. Arnold & Associates of Camdenton, Missouri.

The shallow, non-lithified material was drilled utilizing a hollow stem auger drilling rig. Soil samples were continuously collected with a two and one half foot long split spoon sampler advanced ahead of the augers with a hydraulic hammer. The soil samples were logged by Dames & Moore personnel in accordance with the Unified Soil Classification System (USCS).

Each soil sample collected was stored in a Zip-loc® bag. A photoionization detection (PID) reading was taken of the headspace gas in each of the bagged samples by puncturing the plastic with the tip of the PID probe. The headspace reading is used to approximate organic vapor concentrations. The PID, a Thermo-Environmental OVM Model 580-B, was calibrated daily to a 100 parts per million (ppm) isobutlyene standard. There was no field evidence of impact to the soil based on the PID readings and olfactory indications in the monitoring well; therefore, no soil samples were submitted to the laboratory for analysis. PID readings are presented on the monitoring well log.

Once bedrock was encountered, a temporary casing was set at a depth of 10.5 feet below ground surface (bgs) and the hole was re-entered and diamond cored (NX core) to a depth of approximately 104 feet bgs. The purpose of the temporary casing was to ensure that water used in the coring operation could be recovered and recirculated. Potable water from the City of Camdenton public water supply was used as the coring fluid.

The bedrock was continuously cored using a ten foot NX core barrel. All core material was appropriately marked, logged according to standard logging methods, and stored in NX core boxes. As each core run was removed from the barrel, the bedrock was field screened using the PID. The probe of the PID was run along the length of the core to determine the presence of organic vapors. There was no evidence of impact to the bedrock based on the PID readings and olfactory indications. A well log is attached to this letter report.

The original intent had been to core the well to total depth. However, water loss was encountered during the drilling process beginning at a depth of approximately 22 feet bgs. Water loss appears to have occurred due to the presence of open fractures and void spaces. The water loss problem increased as the boring was deepened, so that the coring operation was terminated at a depth of 104 feet bgs. A total of approximately 5,000 gallons of potable water was lost to the formation.

Following coring activities, the hole was re-entered and reamed out to a depth of approximately 118 feet bgs. Groundwater was encountered at an approximate depth of 105 feet bgs.

Permanent surface casing was installed in competent bedrock to a depth of approximately 37 feet bgs. This depth was chosen in order to case off several void spaces which had been encountered during the drilling, notably the void space from 35.0 to 36.5 feet bgs. The monitoring well was constructed with schedule 80, two-inch inside diameter, polyvinyl chloride (PVC) casing with a 0.010 inch slotted screen in accordance with "Missouri Well Construction Rules, June 1996". The well is completed with a screen length of thirty feet and contains a filter pack that extends approximately four feet above the top of the screen. Approximately five feet of bentonite pellets were placed above the filter pack to serve as an annular seal, and were hydrated. Bentonite grout was placed in the hole to approximately 10 feet bgs. The remaining depth was completed with bentonite pellets to approximately one foot below the top of PVC casing. The well was completed approximately two and one half feet above surface grade with a 6-inch diameter protective casing surrounded by a two foot square concrete surface pad. A locking cap was placed on the protective casing to ensure the integrity of the well.

Prior to sampling, the well was gauged to assess the groundwater level and determine the volume of water to be purged. An attempt was made to air lift the water out during development; however, due to the limited water column and the low recharge rate, the procedure was unsuccessful. In order to develop the well, approximately 10 well volumes of groundwater were removed (approximately 30 gallons). The monitoring well was purged in accordance with RCRA Ground-Water Monitoring TEGD guidelines. Purging was done with a dedicated, disposable, polyethylene bailer and new poly-rope. The purged water was containerized in an on-site 55-gallon drum.

The well was sampled using a dedicated disposable bailer and new poly-rope. The bailer was slowly lowered into the water to minimize agitation. Samples were transferred from the bailer to the sample containers in a manner as to minimize agitation and aeration. Personnel conducting the groundwater sampling wore a new pair of clean disposable latex gloves. A duplicate sample was also collected from the well. The samples were shipped, under proper Chain-of-Custody, in an iced cooler by overnight delivery service to Specialized Assays, Inc. and were analyzed for volatile organic compounds (VOCs) by EPA Method 8260.

Measures were taken to reduce the possibility of cross contamination between sampled intervals. After each use, the soil samplers were decontaminated with a high pressure wash. Personnel who handled tools and collected samples wore a new pair of disposable latex gloves for each sample

acquisition. A decontaminated set of augers, barrel rods, and air rotary rods were used for the installation of the monitoring well.

Investigation-derived waste was segregated according to waste type. The purged water was stored in a 55-gallon drum which remains stored near MW-5 for future use. The water used in the air rotary process and the reamed bedrock material were stored in 55-gallon drums. The drums were properly labeled and staged at the facility in a fenced in area on the west side of the building. Modine is responsible for the proper disposal of these investigation-derived waste.

2.0 ANALYTICAL RESULTS

Soil samples were not submitted to the laboratory for analysis. A groundwater sample and a duplicate sample were collected from MW-5 for analysis. Additionally, a water sample was collected from the decontamination water holding tank and the coring water holding tank. The results obtained for each of the samples are summarized below:

- Monitoring Well MW-5: The groundwater sample collected from MW-5 exhibited a concentration of TCE at 484.1 ppb and cis-1,2-dichloroethene at 28.0 ppb. A duplicate sample was collected from MW-5 which exhibited a concentration of TCE of 458.5 ppb and cis-1,2-dichloroethene of 28.2 ppb.

- Core Holding Tank: The water collected from the core holding tank originated at the facility and exhibited a TCE concentration of 3.0 ppb.

- Decontamination Holding Tank: The water collected from the decontamination holding tank originated at the facility and exhibited a TCE concentration of 3.2 ppb.

3.0 GROUNDWATER ELEVATIONS

Groundwater depths relative to top of casing were determined for all five monitor wells on July 31, 1998. Groundwater depths were determined using a decontaminated Solinst® electronic water level indicator. This indicator was decontaminated between each use. The resulting groundwater elevations, along with the surveyed elevations of the casing tops are shown in Table 1.

The groundwater elevations (Figure 1) confirm the generally trough-like configuration of the groundwater potentiometric surface, which has been observed in previous gauging events. MW-1

is approximately in the center of the trough-like surface. Data from MW-5 demonstrate that groundwater is flowing generally to the southwest, in the direction of the Modine facility. This flow direction is parallel to the direction of the primary fracture set identified in the 1996 Fracture System Investigation. These data strongly suggest that TCE in groundwater beneath the former Hulett lagoon is the source for TCE-impacted groundwater at MW-4.

4.0 GEOPHYSICAL LOGGING

Dames & Moore contracted with Century Geophysical Corporation (Century) to perform geophysical logging of MW-5. This logging was accomplished on July 31. 1998 and was witnessed by Ms. Miesche Francis of Dames & Moore.

The suite of logs run in this well included induction resistivity, gamma ray, and neutron. The 2-inch diameter casing size prevented running the density tool. Since the well contained water only at the base, acoustic and spontaneous potential logs were not run. Copies of the geophysical logs are included as Appendix B.

The results of the logging are discussed below. All depths discussed in this section are depth below top of casing, except as noted.

The resistivity log for MW-5 indicates metallic casing installed to a depth of 40 feet. Rock beneath this casing is shown to be fairly high in resistivity, which is consistent with carbonate rock, and fairly uniform. Both the resistivity and the gamma ray curves do not support major changes in lithology. A conspicuous gamma ray peak, which corresponds to a resistivity low, occurs at 84 feet. This appears to be the same feature observed in all four of the other wells and was referred to in the 1996 fracture system report as the "gamma marker". In all five wells, this feature marks the upper boundary of an increase in resistivity. The gamma marker is estimated to be approximately three feet thick in MW-5. The neutron response increases for nearly 20 feet below the gamma marker, indicating less porous rock. According to the core log, the gamma marker corresponds approximately with a fractured, vuggy crystalline limestone, which overlies a relatively nonporous grainstone. The structural elevation of the gamma marker is 95.44 feet, approximately 30 feet higher relative to the marker at the Modine plant. Therefore, any stratigraphic component of flow in the unsaturated zone may be in the direction of the Modine facility (Figure 2).

6.0 FUTURE TASKS

Dames & Moore has begun the procedures to conduct a groundwater tracing event at the facility. The proper documents have been completed and submitted to the Missouri Department of Natural Resources (MDNR) to obtain permission to conduct this trace. As of the date of this letter report, Dames & Moore has not received a response from the MDNR. However, dye bugs consisting of activated charcoal were placed in all of the on-site monitoring wells (MW-1, MW-2, MW-3, and MW-4) for the purpose of background sampling to determine if fluorescein dye exists in the groundwater beneath the facility. The dye bugs were lowered in the well column approximately half way into the groundwater and left in place for one week. The dye bugs along with a grab groundwater sample were collected from all of the on-site wells and a grab groundwater sample was also collected from the City of Camdenton Mulberry Well. The samples were placed in appropriate containers and shipped via overnight courier to Ozark Underground Laboratory, Inc. to determine the presence, if any, of fluorescein.

7.0 SUMMARY AND CONCLUSIONS

TCE was detected in the groundwater sample collected from MW-5 located near the former Hulett Lagoon. The concentration of TCE significantly exceeds the Drinking Water Standards and Health Advisories level of 5 ppb for TCE. Groundwater appears to flow southwest from the former Hulett Lagoon towards the Modine facility. Based upon these results, it is Dames & Moore's opinion that the source of the TCE in the groundwater beneath the Modine facility is the former Hulett Lagoon.

Mr. Thomas S. Sanicola
Modine Manufacturing Company
Dames & Moore Project No. 27397-035-045
October 19, 1998

Dames & Moore is pleased to present this letter report summarizing the activities associated with the installation of MW-5 at the former Hulett Lagoon and additional tasks associated with the subsurface investigation at the Modine facility in Camdenton, Missouri. If you have any questions or comments regarding the contents of this report, please contact either of the undersigned at (314) 993-4599.

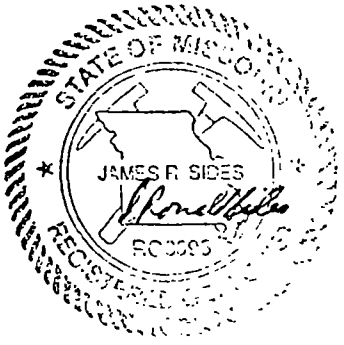
Very truly yours,

DAMES & MOORE

Daniel J. Price, R.G.
Managing Principal
St. Louis Office



J. Ronald Sides, Ph. D.
Senior Geologist



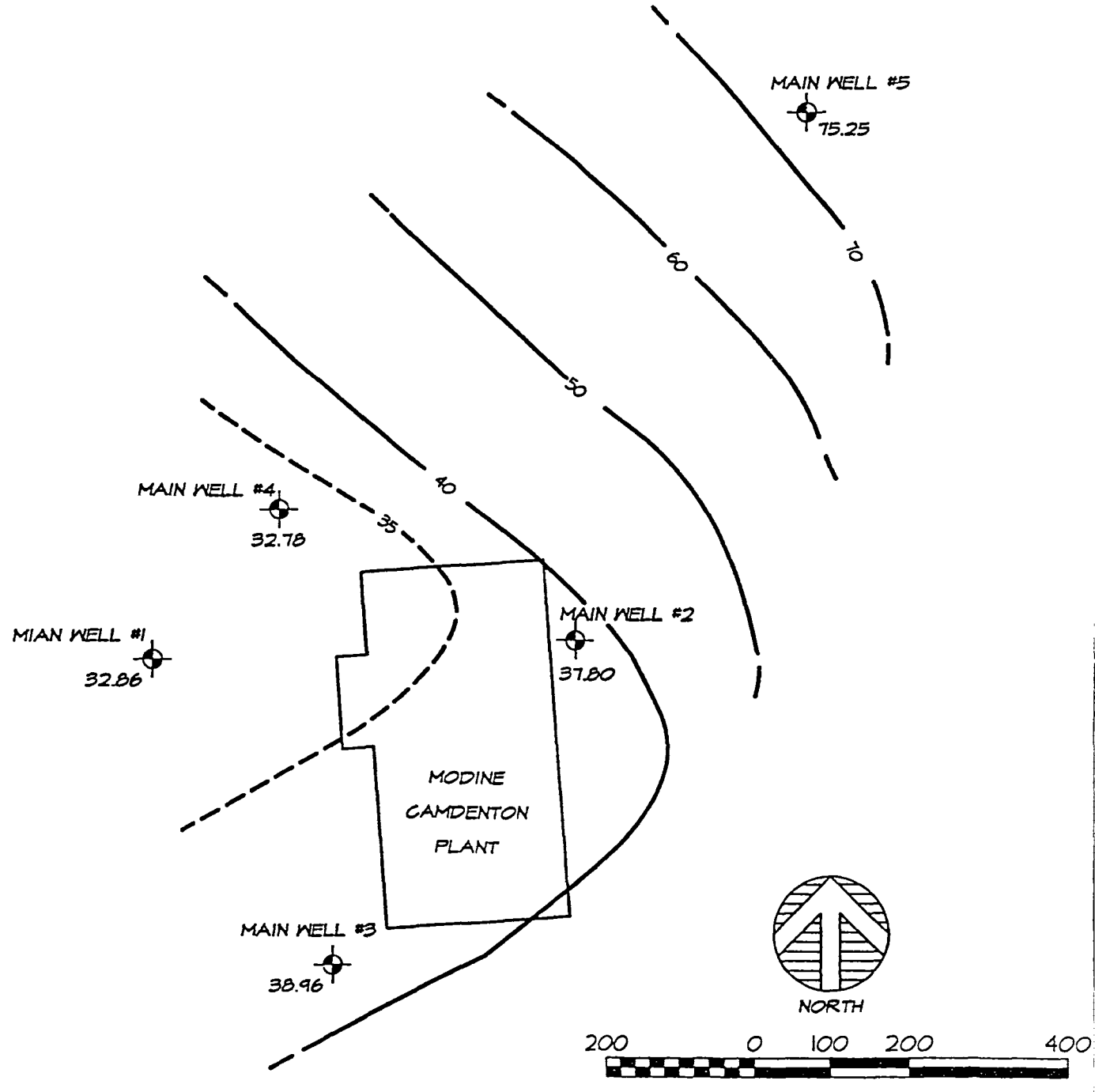
DJP/JRS:nkh
P \045\10-OCT98\MISC_JOB\CORRSPND\SANI_19.JRS

TABLE 1

Groundwater Elevations
July 31, 1998
Modine Heat Transfer Facility
Camdenton, Missouri

	Casing Elevation	Depth to Water	Groundwater Elevation
MW-1	186.61	153.75	32.86
MW-2	204.26	166.46	37.80
MW-3	193.74	154.78	38.96
MW-4	192.24	159.46	32.78
MW-5	179.44	104.19	75.25

* Elevation references a coordinate system previously established for this project.



NOTE:
VERTICAL DATUM IS PROJECT SPECIFIC, NOT USGS.

CONTOUR INTERVAL IS 10 FEET, EXCEPT WHERE DASHED (5 FEET).

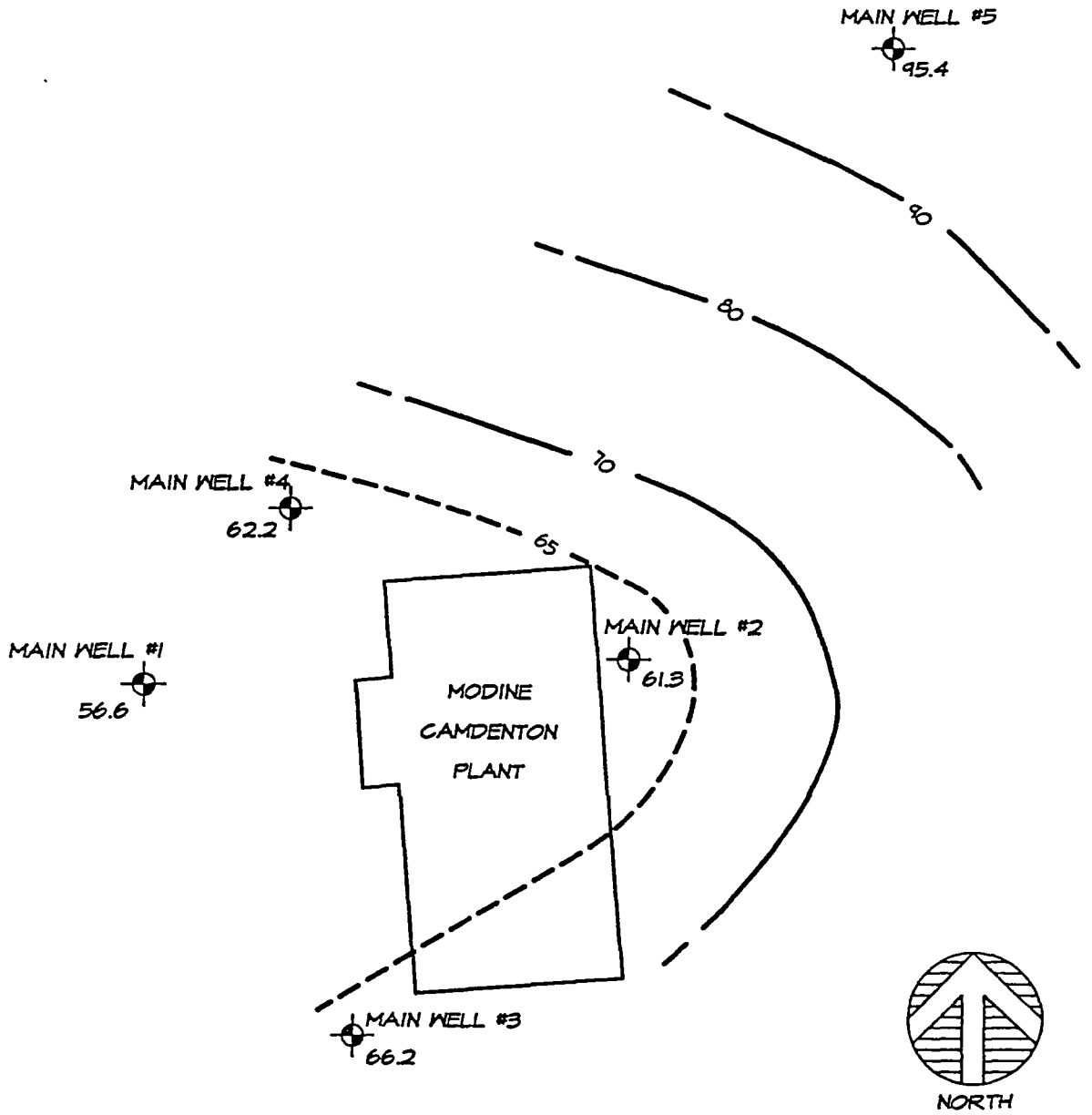
FIGURE 1
GROUNDWATER ELEVATIONS (ft) ON JULY 31, 1998

MODINE HEAT TRANSFER, INC.
CAMDENTON, MISSOURI

DATE: Aug. 20, 1998	
JOB NO.: 27397-035-05	
DRAWN BY: JMS	CHK'D BY: JRS
SCALE: AS SHOWN	

D&M GROUP
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
721 EMERSON ROAD, SUITE 220
ST. LOUIS, MISSOURI 63141
PHONE: 314-993-4599

R:\ENV\27397.035\MODINEFI.DWG 08/20/98



NOTE:
VERTICAL DATUM IS PROJECT SPECIFIC, NOT USGS.

CONTOUR INTERVAL IS 10 FEET, EXCEPT WHERE DASHED (5 FEET).

FIGURE 2
SUBSURFACE STRUCTURE ELEVATION OF GAMMA MARKER

MODINE HEAT TRANSFER, INC.
CAMDENTON, MISSOURI

DATE: Aug. 20, 1998	
JOB NO.: 27397-035-05	
DRAWN BY: JMS	CHK'D BY: JRS
SCALE: AS SHOWN	

DAMES & MOORE GROUP
A DAMES & MOORE GROUP COMPANY
721 EMERSON ROAD, SUITE 220
ST. LOUIS, MISSOURI 63141
PHONE: 314-993-4599

R:\ENV\27397.035\MODINEF2.DWG 08/20/98

GEOLOGIC LOG

Sheet No. 1 of 6
Date 7-7-98

PROJECT MARINE SUBSURFACE INVESTIGATION

Hole No. MW-5 | Angle (from Horizontal) Vertical | Ground Elevation
Feature Former Hulett Lagoon | Bearing | Rock Elevation
Coordinates: N | Date Started 7-9-98 | Overburden Thickness 10.5'
E | Date Completed 7-10-98 | Ground–Water Elevation 104.2' (7-16-98
Core Sizes | Total Depth 104' | Logged by M.M. FRANCIS

Depth (Elevation)	Graphic Log: Lithology	Graphic Log: Structure	Graphic Log: Attitude	Classification and Physical Condition	C.R.–Graphic	Core Rec. %	RQD %		Remarks (Sample Data, Water Levels, Drilling Characteristics etc.)
1				ML BROWN SILTY CLAY with brownish yellow stringers, soft, dry, with trace chert gravel grading to BROWNISH YELLOW.					50% Recovery
2					2	5	5	7	ovm 9.8 #1 0-2'
3				CL YELLOWISH RED CLAY with brown stringers, hard, moist, stiff, with chert gravel					50% Recovery
4					4	4	7	8	ovm 10.7 #2 2-4'
5									75% Recovery
6					4	6	10	10	ovm 8.8 #3 4-6'
7				1" chert brs at 7.0'					100% Recovery
8					3	4	9	10	ovm 16.2 #4 6-8'
9				Slight organic odor at 9.1'					50% Recovery
10					5	6	11	5C	1/4" ovm 5.9 #5 8-10'
				Weathered limestone, H. brown, chert bearing					
11			0	Top of Rock at 10.5'					Core #1 Start 3:55 P Start 4:25 P
12	LS		0	Xtalline Limestone, Grainstone, Light Gray, thin layers of more finely xtalline, very porous					Fracture not open
13			0						OVM 0.0
14			0						
15			0	Vuggy and Chert bearing 14.5'-15.0' Bedding Plane Joints					
16			0	Limestone, grainstone, H. gray, porous vuggy					Core #2 Start 9:15 A Start 9:44 A
17			0	Mudst grainstone, mottled gray and tan					Fractures not open
18				Marl Layer 17.2'-18.5'					No PID reading
19			0	Limestone, grainstone, H. gray, chert bearing					Core #3 Start 9:21 A Start 9:57 A

7/18/98

GEOLOGIC LOG

Sheet No. 2 of
Date 7-8-98

PROJECT MOUNT SURFACE INVESTIGATION

Hole No. MW-5 | Angle (from Horizontal) Vertical | Ground Elevation
Feature Former Hulett Lagoon | Bearing | Rock Elevation
Coordinates: N | Date Started 7-7-98 | Overburden Thickness 10.5'
E | Date Completed 7-10-98 | Ground–Water Elevation
Core Sizes | Total Depth 104' | Logged by M. MEEDS

Depth (Elevation)	Graphic Log: Lithology	Graphic Log: Structure	Graphic Log: Attitude	Classification and Physical Condition	C.R.–Graphic	Core Rec. %	RQD %	Remarks (Sample Data, Water Levels, Drilling Characteristics etc.)
21	LS		70	21.2' 70° Fracture.				Fractures not open
22			0			93%	34%	1" fluid loss
23			0					[48" x 96" trough]
24			60	23.3' 60° Fracture				
25				Limestone				Core #4 Start 10:14A
26			0					Stop 11:14A
			0	Open fractures				
27				VOID 26.6' - 27.6'				Clay seam
28	LS		0					
29						66%	42.%	
30				29.4' open fracture				
31								2" fluid loss
32								
33				VOID 32.1' - 33.3'				
34		/	45°					
35		+	90°					Core #5 Start
36				VOID 35.0' - 36.5'		60%	20%	No circulation 100% fluid loss
37	LS			Limestone,				open fractures
38								
39				VOID 38.5' - 39.0'				
								Core #6

GEOLOGIC LOG

Sheet No. [illegible]
Date 7-[illegible]

PROJECT MAINE SUBSURFACE INVESTIGATION

Hole No. MW-5 | Angle (from Horizontal) Vertical | Ground Elevation
Feature Fannar Hulett house | Bearing | Rock Elevation
Coordinates: N | Date Started 7-7-98 | Overburden Thickness 10.5'
E | Date Completed 7-10-98 | Ground–Water Elevation
Core Sizes | Total Depth 10' | Logged by M.M. FRANCIS

Depth (Elevation)	Graphic Log: Lithology	Graphic Log: Structure	Graphic Log: Attitude	Classification and Physical Condition	C.R.–Graphic	Core Rec. %	RQD %	Remarks (Sample Data, Water Levels, Drilling Characteristics etc.)
40								
41			45	40.6' 45° fracture				
			0	Chert, gray to light gray banded				
42			0	42.0-42.8' Chert, rubble, with glauconite fractured.				
43								
				Limestone rubble, lt. brown w/ sandstone				
44				Limestone, grainstone, brown				
			0	44.5' open fractures				Core #1 Start 5:10 P
45			0					
		\	65	45.3' 65° fracture				
46	LS			Limestone, mudstone, lt brown to beige, mottled				
47				Limestone, grainstone, banded, lt brown to beige, vuggy				
48				48.3' Limestone, mudstone to grainstone lt brown				
49			0					
		/	35	49.8' 35° fracture				
50			0					
51			0					
52			0					
		/	75	52.2' 75° fracture				
7-9-98			0					OVM 0.0 Stop 6:10P
53			0	Chert rubble, banded gray to lt gray				7-9-98 Start 7:30A
			70	53.3' Limestone, grainstone, brown. mottled				Numerous attempts made to complete run. Stop 12:47P
			75	53.5' 70° fracture 53.8' 75° fracture				
54			0	Chert, lt brown, vuggy				Core #3 Start 1:00 P
			0	Limestone, grainstone, lt brown, chert bearing				Stop 1:26 P
55		⊥	90	55.1' 90° open fracture.				OVM 0.0
			0	Chert, rubble, gray				
			0	Limestone, mudstone, lt brown, mottled chert bearing (beige)				
56								
				chert, gray, vuggy				
57			0					
			65	57.0' 45° open fracture				
			0					Core #4 Start 1:35P

GEOLOGIC LOG

Sheet No. 4 of 4
Date 7-9-98

PROJECT MODINE SUBSURFACE INVESTIGATION

Hole No. MW-5 | Angle (from Horizontal) | Ground Elevation
Feature Former Hulk #1 Lagoon | Bearing | Rock Elevation
Coordinates: N | Date Started 7-7-98 | Overburden Thickness 10.5'
E | Date Completed 7-10-98 | Ground-Water Elevation
Core Sizes | Total Depth 104' | Logged by M.M. FRANCIS

Depth (Elevation)	Graphic Log: Lithology	Graphic Log: Structure	Graphic Log: Attitude	Classification and Physical Condition	C.R.—Graphic	Core Rec. %	RQD %	Remarks (Sample Data, Water Levels, Drilling Characteristics etc.)
60				60.0' open fracture				
61			70	chert, rubble gray				
			0	61.2' Limestone, lt brown				
				61.4' Chert				
62			90	61.6' Limestone, grainstone, lt brown		96%	50%	OVM 0.0
			0	banded, vuggy, mottled				
			0	62.0' open fractures				
63			0	62.5' Limestone, lt brown, chert				
				bearing.				
64								Core# 10 Start 2:45P
65	LS		0	Limestone, grainstone, chert				Stop 2:55P
				bearing, vuggy, mottled, banded				
66			0	lt beige		100%	85%	OVM 0.0
67								
			0					
68				chert, lt. gray to med. gray bands				
		1	90	with limestone vugs				
69			0	68.2-68.6' vertical open fracture				Core# 11 Start 4:50P
			0	69.2' Limestone, grainstone, lt.				5:11P
70			0	brown to beige banded,				
				mottled, vuggy (chert filled)		100%	88%	OVM 0.0
71	LS			porous				
72								
73				Limestone, mudstone, vuggy, chert				
				bearing				
7-10-98 74				FORMER LOSS OF C.5'				
				Limestone, grainstone, lt brown,				Core# 12. Start 11:35A
75			0	banded, vuggy, chert bearing				7-10-98 Stop 1:45P
	LS		60	open fractures				
76								OVM 0.0
77								
78			0	open fracture		98%	84%	
			0	chert, lt. beige, mottled with				
79				gray bands				
			0	open fracture.				

GEOLOGIC LOG

Sheet No. 5 of 6
Date 7-10-98

PROJECT MODINE SUBSURFACE INVESTIGATION

Hole No. MW-5 | Angle (from Horizontal) | Ground Elevation
Feature Former Hulett Lagoon | Bearing | Rock Elevation
Coordinates: N | Date Started 7-7-98 | Overburden Thickness 10.5'
E | Date Completed 7-10-98 | Ground-Water Elevation
Core Sizes | Total Depth 104' | Logged by M. M. Evans

Depth (Elevation)	Graphic Log: Lithology	Graphic Log: Structure	Graphic Log: Attitude	Classification and Physical Condition	C.R.—Graphic	Core Rec. %	RQD %	Remarks (Sample Data, Water Levels, Drilling Characteristics etc.)
80		~	0	Chert, gray to med. gray banded open fracture				
81				Limestone, brown, xystalline Chert, gray, mottled, vuggy				
82		~	0	Limestone, lt brown		18%	8%	
		~	0	Chert, gray banded				
83		≈	0	Limestone, brown, vuggy				
		/	45	83.6' 45° fracture				
84		~	0					Core #13 Start 1:55P Stop 2:38P
85				Chert, gray to lt gray banded				
86		1	90	Open vertical fracture				OVM 0.0
		≈	0					
87				Limestone, lt brown Chert (86.0')				
88		~	0	Limestone, grainstone, chert bearing, vugg, mottled				
89		≈	0			92%	73%	
		/	45					
90		/	30					
		≈	0					
91								
92								
93		~	0					
		~	0					
94		≈	0	Limestone, porous, grainstone, lt. brown				Core #14 Start 3:17P Stop 3:30P
95		≈	0	Chert, med. gray mottled, vuggy				
96		≈	0					OVM 0.0
97				Limestone, lt. brown, grainstone banded		98%	75%	
98								
99		~	0					

GEOLOGIC LOG

Sheet No. 6 of 6
Date 7-10-98

PROJECT MODINE SUBSURFACE INVESTIGATION

Hole No. MW-5 | Angle (from Horizontal) | Ground Elevation
Feature FORMER HULETT LAGOON | Bearing | Rock Elevation
Coordinates: N | Date Started 7-7-98 | Overburden Thickness 10.5'
E | Date Completed 7-10-98 | Ground–Water Elevation
Core Sizes | Total Depth 104' | Logged by M.M. FRANCIS

Depth (Elevation)	Graphic Log: Lithology	Graphic Log: Structure	Graphic Log: Attitude	Classification and Physical Condition	C.R.—Graphic	Core Rec. %	RQD %	Remarks (Sample Data, Water Levels, Drilling Characteristics etc.)
100		≈	0	Limestone, lt gray, porous grainstone				
101								
102	LS			Chert, lt gray with dark gray vugs				
103				Limestone, grainstone, lt. brown banded, mottled, chert bearing				
104		≈	0	END OF CORE				

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

RECEIVED
NOV - 5 1998

721 Emerson Road, Suite 220
Saint Louis, Missouri 63141-6748
314 993 4599 Tel
314 993 4895 Fax

Fax Sheet

To CHRIS KUMP Company MDNR Fax Number 573-526-5268

From RON SIDES

Date 11/5/98

Subject MODINE

No. of pages 7

ANALYTICAL REPORTS, MW-5

1) SAMPLE
2) SAMPLE DUP
3) TRIP BLANK

CALL WITH ANY QUESTIONS

This message is intended only for the use of the individual or entity to which it is addressed, and may contain information that is privileged, confidential, and exempt from disclosure under applicable law. If the reader of the message is not the intended recipient, or the employee or agent responsible for delivering the message, you are hereby notified that any dissemination, distribution or copying of the communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone and return the original message to us at the above address via the U.S. Postal Service.

ANALYTICAL REPORT

DAMES & MOORE 7378
DEBORAH Y. WHITAKER
2135 E. SUNSHINE, SUITE 105
SPRINGFIELD, MO 65804

Project: 27397-035-045
Project Name: MODINE SUBSURFACE INVEST
Sampler: MIESCHE FRANCIS

Lab Number: 98-A83247
Sample ID: MW05-GW1-Q1-98
Sample Type: Ground water
Site ID:

Date Collected: 7/16/98
Time Collected: 12:52
Date Received: 7/17/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
VOLATILE ORGANICS										
Acetone	ND	mg/l	0.0100	0.0100	1	7/18/98	1:15	G.Norton	8260B	199
Benzene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Bromobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Bromochloromethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Bromoform	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Bromomethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
2-Butanone	ND	mg/l	0.0100	0.0100	1	7/18/98	1:15	G.Norton	8260B	199
n-Butylbenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
sec-Butylbenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
t-Butylbenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Carbon disulfide	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Carbon tetrachloride	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Chlorobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Chloroethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
2-Chloroethylvinylether	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Chloroform	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Chloromethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
2-Chlorotoluene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
4-Chlorotoluene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,2-Dibromo-3-chloropropane	ND	mg/l	0.0100	0.0100	1	7/18/98	1:15	G.Norton	8260B	199
Dibromochloromethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,2-Dibromoethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Dibromomethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,2-Dichlorobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,3-Dichlorobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,4-Dichlorobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Dichlorodifluoromethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,1-Dichloroethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,2-Dichloroethane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,1-Dichloroethene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
cis-1,2-Dichloroethene	0.0280	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
trans-1,2-Dichloroethene	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	19
1,2-Dichloropropane	ND	mg/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	1

ANALYTICAL REPORT

Laboratory Number: 98-A83247
Sample ID: MW05-GW1-Q1-98

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
1,3-Dichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
2,2-Dichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,1-Dichloropropene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
cis-1,3-Dichloropropene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
trans-1,3-Dichloropropene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Ethylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Hexachlorobutadiene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
2-Hexanone	ND	ug/l	0.0100	0.0100	1	7/18/98	1:15	G.Norton	8260B	199
Isopropylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
4-Isopropyltoluene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
4-Methyl-2-pentanone	ND	ug/l	0.0100	0.0100	1	7/18/98	1:15	G.Norton	8260B	199
Methylene chloride	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Naphthalene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
n-Propylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Styrene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,1,1,2-Tetrachloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,1,2,2-Tetrachloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Tetrachloroethene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Toluene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,2,3-Trichlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,2,4-Trichlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,1,1-Trichloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,1,2-Trichloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Trichloroethene	0.4841	ug/l	0.0200	0.0020	10	7/20/98	16:39	G.Norton	8260B	199
1,2,3-Trichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,2,4-Trimethylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
1,3,5-Trimethylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Vinyl chloride	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Xylenes	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Bromodichloromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199
Trichlorofluoromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:15	G.Norton	8260B	199

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
VOA Surrogate, 1,2-Dichloroethane, d4	77.	70. - 131.
VOA Surrogate, Toluene d8	90.	83. - 115.
VOA Surrogate, 4-Bromofluorobenzene	88.	73. - 119.
VOA Surrogate, Dibromofluoromethane	82.	72. - 130.

ANALYTICAL REPORT

DAMES & MOORE 7378
DEBORAH Y. WHITAKER
2135 E. SUNSHINE, SUITE 105
SPRINGFIELD, MO 65804

Project: 27397-035-045
Project Name: MODINE SUBSURFACE INVEST
Sampler: MIESCHE FRANCIS

Lab Number: 98-A83248
Sample ID: MW05-GW1-Q1-98-D
Sample Type: Ground water
Site ID:

Date Collected: 7/16/98
Time Collected: 12:52
Date Received: 7/17/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
VOLATILE ORGANICS										
Acetone	ND	ug/l	0.0150	0.0100	1	7/18/98	1:51	G.Norton	8260B	199
Benzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Bromobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Bromochloromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Bromoform	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Bromomethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
2-Butanone	ND	ug/l	0.0100	0.0100	1	7/18/98	1:51	G.Norton	8260B	199
n-Butylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
sec-Butylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
t-Butylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Carbon disulfide	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Carbon tetrachloride	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Chlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Chloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
2-Chloroethylvinylether	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Chloroform	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Chloromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
2-Chlorotoluene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
4-Chlorotoluene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,2-Dibromo-3-chloropropane	ND	ug/l	0.0100	0.0100	1	7/18/98	1:51	G.Norton	8260B	199
Dibromochloromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,2-Dibromoethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Dibromomethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,2-Dichlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,3-Dichlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,4-Dichlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Dichlorodifluoromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,1-Dichloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,2-Dichloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,1-Dichloroethene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
cis-1,2-Dichloroethene	0.0282	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
trans-1,2-Dichloroethene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,2-Dichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199

ANALYTICAL REPORT

Laboratory Number: 98-A83248
Sample ID: MW05-GW1-Q1-98-D

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
1,3-Dichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
2,2-Dichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,1-Dichloropropene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
cis-1,3-Dichloropropene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
trans-1,3-Dichloropropene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Ethylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Hexachlorobutadiene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
2-Hexanone	ND	ug/l	0.0100	0.0100	1	7/18/98	1:51	G.Norton	8260B	199
Isopropylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
4-Isopropyltoluene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
4-Methyl-2-pentanone	ND	ug/l	0.0100	0.0100	1	7/18/98	1:51	G.Norton	8260B	199
Methylene chloride	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Naphthalene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
n-Propylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Styrene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,1,1,2-Tetrachloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,1,2,2-Tetrachloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Tetrachloroethene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Toluene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,2,3-Trichlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,2,4-Trichlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,1,1-Trichloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,1,2-Trichloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Trichloroethene	0.4585	ug/l	0.0200	0.0020	10	7/20/98	11:57	G.Norton	8260B	199
1,2,3-Trichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,2,4-Trimethylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
1,3,5-Trimethylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Vinyl chloride	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Xylenes	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Bromodichloromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199
Trichlorofluoromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	1:51	G.Norton	8260B	199

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
VOA Surrogate, 1,2-Dichloroethane, d4	82.	70. - 131.
VOA Surrogate, Toluene d8	89.	83. - 115.
VOA Surrogate, 4-Bromofluorobenzene	90.	73. - 119.
VOA Surrogate, Dibromofluoromethane	85.	72. - 130.

ANALYTICAL REPORT

DAMES & MOORE 7378
DEBORAH Y. WHITAKER
2135 E. SUNSHINE, SUITE 105
SPRINGFIELD, MO 65804

Lab Number: 98-A83249
Sample ID: TRIP BLANK
Sample Type: Ground water
Site ID:

Project: 27397-035-045
Project Name: MODINE SUBSURFACE INVEST
Sampler: MIESCHE FRANCIS

Date Collected:
Time Collected:
Date Received: 7/17/98
Time Received: 9:00

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
VOLATILE ORGANICS										
Acetone	ND	mg/l	0.0100	0.0100	1	7/18/98	0:01	G.Norton	8260B	199
Benzene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Bromobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Bromochloromethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Bromoform	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Bromomethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
2-Butanone	ND	mg/l	0.0100	0.0100	1	7/18/98	0:01	G.Norton	8260B	199
n-Butylbenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
sec-Butylbenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
t-Butylbenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Carbon disulfide	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Carbon tetrachloride	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Chlorobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Chloroethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
2-Chloroethylvinylether	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Chloroform	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Chloromethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
2-Chlorotoluene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
4-Chlorotoluene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,2-Dibromo-3-chloropropane	ND	mg/l	0.0100	0.0100	1	7/18/98	0:01	G.Norton	8260B	199
Dibromochloromethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,2-Dibromoethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Dibromomethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,2-Dichlorobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,3-Dichlorobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,4-Dichlorobenzene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Dichlorodifluoromethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,1-Dichloroethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,2-Dichloroethane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,1-Dichloroethene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
cis-1,2-Dichloroethene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
trans-1,2-Dichloroethene	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,2-Dichloropropane	ND	mg/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199

ANALYTICAL REPORT

Laboratory Number: 98-A83249
Sample ID: TRIP BLANK

Analyte	Result	Units	Report Limit	Quan Limit	Dil Factor	Date	Time	Analyst	Method	Batch
1,3-Dichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
2,2-Dichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,1-Dichloropropene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
cis-1,3-Dichloropropene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
trans-1,3-Dichloropropene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Ethylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Hexachlorobutadiene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
2-Hexanone	ND	ug/l	0.0100	0.0100	1	7/18/98	0:01	G.Norton	8260B	199
Isopropylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
4-Isopropyltoluene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
4-Methyl-2-pentanone	ND	ug/l	0.0100	0.0100	1	7/18/98	0:01	G.Norton	8260B	199
Methylene chloride	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Naphthalene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
n-Propylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Styrene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,1,1,2-Tetrachloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,1,2,2-Tetrachloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Tetrachloroethene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Toluene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,2,3-Trichlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,2,4-Trichlorobenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,1,1-Trichloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,1,2-Trichloroethane	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Trichloroethene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,2,3-Trichloropropane	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,2,4-Trimethylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
1,3,5-Trimethylbenzene	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Vinyl chloride	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Xylenes	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Bromodichloromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199
Trichlorofluoromethane	ND	ug/l	0.0020	0.0020	1	7/18/98	0:01	G.Norton	8260B	199

ND = Not detected at the report limit.

Surrogate	% Recovery	Target Range
VOA Surrogate, 1,2-Dichloroethane, d4	100.	70. - 131.
VOA Surrogate, Toluene d8	87.	83. - 115.
VOA Surrogate, 4-Bromofluorobenzene	94	73. - 119.
VOA Surrogate, Dibromofluoromethane	95.	72. - 130.

FROM D&M ST LOUIS MO (FAX)11 05 98 15 07/ST.15 04/NO 3561025330 P 7

Former Hulett Lagoon Site
Combined PA/SI
Reference 57

MISSOURI DEPARTMEN

Headqu

2901 West Truman Boulevard, P O Box 180, Jefferson City, Missouri 65102-0180
Telephone 573/751-4115 ◆ Missouri Relay Center, 1-800-735-2966 (TDD)

JERRY M CONLEY, Director

Season's Greetings

December 14, 1998

RECEIVED

DEC 1 5 1998

HAZARDOUS WASTE PROGRAM
MISSOURI DEPARTMENT OF
NATURAL RESOURCES

Ms. Julie Kelsey
Department of Natural Resources
P. O. Box 176
Jefferson City, MO 65102-0176

Re: Herculaneum Smelter; Faerber Farm
Former Hulett Lagoon; Highway AF Wells

Dear Ms. Kelsey:

Thank you for your letter of November 2, 1998 regarding rare, threatened and endangered species within the proposed project area.

Review of our records show that public lands, sensitive species or communities are known to exist on or near the above referenced sites. Please refer to the enclosed Heritage Database report for details. This report reflects information we currently have in our database. We provide this information for planning purposes only; it should not be regarded as a definitive statement as to the presence or absence of rare/endangered species or high-quality natural communities. Additional on-site inspections may be needed to verify the presence or absence of such species or communities.

Thank you for the opportunity to review and comment.

Sincerely,

Mary Lyon

MARY LYON
POLICY ANALYST

ML:klm
Enclosure

COMMISSION

ANITA B GORMAN, Kansas City
RANDY HERZOG, St Joseph
RONALD J. STITES, Plattsburg
HOWARD L. WOOD, Bonne Terre

MO DEPARTMENT OF NATURAL RESOURCES
P.O. BOX 176
JEFFERSON CITY, MO 65102-0176

FORMER HULETT LAGOON

The following species and/or natural communities are known to occur on or in the vicinity of the project site:

Scientific Name	Common Name	Federal Status	State Status	State Rank	Size/ Acres	Township/ Range	Sec.	Ownership
4-mile radius - source #1 and #2								
SPIRANTHES OVALIS VAR EROSTELLATA	OVAL LADIES' TRESSES			S2	0	037N017W	01	DNR
AMBYSTOMA ANNULATUM	RINGED SALAMANDER			S3	0	038N017W	27	PRIVATE
CHERT SAVANNA				S2	45	037N017W	02	DNR
DOLOMITE GLADE				S3	17	037N017W	11	DNR
CHERT SAVANNA				S2	50	037N017W	14	DNR
TYPHLICHTHYS SUBTERRANEUS	SOUTHERN CAVEFISH			S2S3	0	037N017W	02	DNR
DOLOMITE GLADE				S3	24	038N017W	35	DNR
DOLOMITE GLADE				S3	12	037N017W	10	DNR
MOIST LIMESTONE/DOLOMITE CLIFF				S4S5	0	037N017W	01	DNR
ARDEA HERODIAS	GREAT BLUE HERON			S5	0	037N017W	03	DNR
DOLOMITE GLADE				S3	13	037N017W	12	DNR
DRYOPTERIS CARTHUSIANA	SPINULOSE SHIELD FERN			S1	0	037N017W	01	DNR
DOLOMITE GLADE				S3	21	037N017W	11	DNR
HEMIDACTYLIUM SCUTATUM	FOUR-TOED SALAMANDER			S3	0	037N017W	02	DNR
MYOTIS GRISESCENS	GRAY BAT	E	E	S3	0	037N017W	02	DNR
LIMESTONE/DOLOMITE TALUS				S4S5	3	037N017W	01	DNR
DOLOMITE GLADE				S3	20	037N017W	11	DNR
MESIC FOREST				S3	5	037N017W	01	DNR
DRYOPTERIS GOLDIANA	GOLDIE'S FERN			S2	0	037N017W	01	DNR
DOLOMITE GLADE				S3	14	037N017W	10	DNR
DOLOMITE GLADE				S3	12	037N017W	01	DNR
DOLOMITE GLADE				S3	10	037N016W	18	PRIVATE
15 river miles, source #1								
MYOTIS GRISESCENS	GRAY BAT	E	E	S3	0	038N018W	02	PRIVATE

MO DEPARTMENT OF NATURAL RESOURCES

FORMER HULETT LAGOON

Additional in formation for planning purposes:

Gray bats are likely to occur in the project area, as they forage over streams, rivers, and reservoirs in this part of Missouri.

Pallid sturgeons are big river fish that may range widely in the Mississippi River and Missouri River system. Because the preferred habitat and range of the species are unknown, any project that modifies big river habitat or impacts water quality should consider the possible impact to pallid sturgeon populations.

Overwintering bald eagles may occur in the project area, as they are common winter residents in big river habitats and major lakes where they feed on fish.

Public land in the 4-mile radius, source #1 and #2:

Camdenton Conservation Service Center	Missouri Depratment of Conservation
Ha Ha Tonka State Park	Missouri Department of Natural Resources
Ha Ha Tonka Savanna Natural Area	Missouri Department of Natural Resources

Public land along 15 river miles, source #1:

Larry Gale Access	Missouri Department of Conservation

FEDERAL STATUS - The federal status is derived from the provisions of the federal Endangered Species Act, which is administered by the U.S Fish and Wildlife Service. The Endangered Species Act provides federal protection for plants and animals listed as Endangered or Threatened. E = Endangered, T = Threatened, C = Candidate for Federal listing.

STATE STATUS (E) - the state status is determined by the Department of Conservation under constitutional authority. Rule 3CSR10-4.111Endangered Species of the *Wildlife Code of Missoun* and certain state statutes apply to state Endangered species

STATE RANK - A numeric rank of relative endangerment based primanly on the number of occurrences of the species within the state of Missouri. S1 = Critically imperiled in the state, S2 = Imperiled in the state, S3 = Rare and uncommon in the state

Heron rookeries, eastern collared lizard populations, natural communities and geologic features are recognized as sensitive biological resources and may also appear on this report

Former Hulett Lagoon Site
Combined PA/SI
Reference 58

United States Department of the I

FISH AND WILDLIFE SERVICE
Ecological Services
Columbia Field Office
608 East Cherry Street, Room 200
Columbia, Missouri 65201
Tel: 573/876-1911 Fax: 573/876-1914

IN REPLY REFER TO.

FWS/AES-CMFO

DEC 18 1998

Ms. Julie B. Kelsey
Department of Natural Resources
Hazardous Waste Program
P.O. Box 176
Jefferson City, Missouri 65102-0176

Dear Ms. Kelsey:

This letter is in response to your November 2, 1998 letter asking the U.S. Fish and Wildlife Service (Service) for information on the presence of federally-listed threatened and endangered species, sensitive environments, and wetlands which may be present at or near the Herculaneum Smelter in Johnson County (Township 41N, Range 5E, Section 29), the Faerber Farm in Gasconade County (Township 45N, Range 4W, Section 6), the former Hulett Lagoon in Camden County (Township 38N, Range 17W, Section 24), and the Highway AF Wells in Franklin County (Township 40N, Range 2W, Section 5). This response is provided by the Service under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969 (42 U.S C. 4321-4327), and the Endangered Species Act of 1973, as amended (16 U.S.C 1531-1543).

None of the sites being investigated appear to impact State or Federal fish and wildlife lands or facilities, nor do they impact lands which were acquired or are managed with Federal grant-in-aid assistance under the Wildlife Restoration Act (Pittman-Robertson Act, Public Law 75-415) or the Fish Restoration Act (Dingell-Johnson Act, Public Law 81-681).

Herculaneum Smelter and Faerber Farm

Both the Herculaneum Smelter and the Faerber Farm are in close proximity to the Missouri and Mississippi Rivers and habitats associated with the federally-listed endangered pallid sturgeon (*Scaphirhynchus albus*), threatened Bald Eagle (*Haliaeetus leucocephalus*), endangered Interior Least Tern (*Sterna antillarum athalassos*), and endangered Piping Plover (*Charadrius melodius*), which occur along either river during certain times of the year Due to the proximity of the Faerber Farm to the Missouri River and the proximity of the Herculaneum site to Jefferson County, the federally-listed endangered Indiana bat (*Myotis sodalis*) might also occur

Pallid Sturgeon

The federally-listed pallid sturgeon is widely distributed in the Missouri River and also occurs in the Mississippi River south of St. Louis, downstream from the mouth of the Missouri These fish are well adapted to the bottoms of large, turbid, free-flowing rivers with swift water

Major threats to this species include habitat destruction, over harvest, and pollution. Though more research is necessary, it is suspected that pollution of the Missouri River by organic wastes coming from cities, livestock impoundments, industrial areas, and packing houses have negatively affected populations as sites such as these have increased over time and occur in nearly 45% of the pallid sturgeon's range.

In addition, elevated polychlorinated biphenyls (PCB's), cadmium, mercury, and selenium have been detected in tissue samples collected from pallid sturgeon in the Missouri River. Other contaminants, such as chlordane, DDE, DDT, and dieldrin have also been detected. Abandoned landfills, mines, sewage treatment plants, and industries all have high potential to contaminate pallid sturgeon habitat.

Bald Eagle

The federally-listed threatened Bald Eagle frequently winters in forested habitat along the Missouri and Mississippi Rivers. Bald Eagles generally prefer the largest trees (> 12 inches diameter at breast height) for perching and roosting. They generally forage on fish, dead and dying waterfowl, and carrion. Wintering populations have been increasing in Missouri, although counts fluctuate widely from year to year dependent upon ice over in the northern part of the eagle's range. Nesting Bald Eagles are also increasing, but to date, no nest sites are near either the Herculaneum or Faerber sites.

Eagles can be adversely affected by heavy metals, bacteria, and other contaminants. Due to the scavenger behaviors of the eagle, they often feed on dead or dying prey which may have been poisoned in some way or may have elevated bacterial levels. In such cases, eagles can be affected through a secondary pathway in the food chain which could harm or kill individuals. Direct toxic effects of organochlorines such as dieldrin, endrin and DDT have also contributed significantly to declines in eagle populations.

Interior Least Tern

The federally-listed endangered Interior Least Tern currently nests in the Bootheel region of Missouri along the Mississippi River. Terns presently use the Missouri River as a migration corridor from nesting sites in Nebraska and the Dakotas. During these times, May and between August and early September, birds are seen more frequently. They may use shallow, seasonal wetlands located in the Missouri River floodplain to rest and forage. The primary cause of decline for Interior Least Terns is habitat destruction and predation, though elevated levels of heavy metals have been found in egg tissue taken from the bootheel nesting grounds (Charbonneau, pers. comm).

Piping Plover

The federally-listed threatened Piping Plover occur in Missouri as transients during migrational periods to wintering grounds on the Gulf Coast and are predominantly from the Northern Great Plains population. Piping Plovers do not nest in Missouri, and historical records do not indicate they ever did (Fish and Wildlife Service, 1988). Birds only occur very rarely between April and May and August through September during migrational flights. Mud flats, sand bars, and wet open fields on or near the Missouri River floodplain may be utilized during this period for rest and foraging. The primary cause for

Piping Plover decline is habitat destruction, predation, and human disturbance.

Indiana bat

The federally-listed endangered Indiana bat may also occur near these two sites. Indiana bats spend the winter hibernating in caves in the Ozarks. During April and May, females migrate north and establish small maternity colonies in suitable sites within wooded riparian areas, floodplain forests, or upland woodlots. Maternity roost sites tend to be in dead or dying trees greater than 9 inches in diameter at breast height and with loose or exfoliating bark. Trees most likely to have loose or exfoliating bark are dead oaks, hickories, elms, green and white ash, silver maple, and eastern cottonwood, or living shagbark hickory. Preferred roost sites are located in forest openings, at the forest edge, or where tree canopy is sparse, and within 1 km (0.6 mi.) of water where they forage on flying insects. Indiana bats continue to decline in parts of its range, including Missouri. Reasons for decline are habitat disturbance/destruction, deforestation, stream channelization, and pesticides.

Finally, both the sturgeon chub (*Macrhybopsis gelida*) and sicklefin chub (*M. meeki*) have been proposed as Candidates for listing and occur in the Mississippi and Missouri Rivers. To date, they have no protection under the Endangered Species Act, and are provided here for your information only. Both the sicklefin and the sturgeon chub are close associates, occupying the open channels of swift, large, turbid rivers over sand and fine gravel. Neither species have ever been abundant in the Missouri River but are more common in the lower 300 miles of the river.

Former Hulett Lagoon

No federally-listed threatened or endangered species occur directly on this site, however, Bald Eagles do winter at the Lake of the Ozarks. Please see our comments above regarding habitat and life history traits of wintering Bald Eagles.

Highway AF Wells

The federally-listed endangered Indiana bat has been documented at Meramec State Park. The three creeks listed are not within the same watershed as the Meramec, however, during the summer roosting period, Indiana bats may utilize habitats along each creek as they migrate north. See our comments above regarding Indiana bat habitat and life history traits.

The federally-listed endangered gray bat *(Myotis grisescens)* also has been documented in cave habitats at Meramec State Park. The gray bat occupies a limited geographic range in limestone karst areas of the southeastern United States, including Missouri. With rare exception, the gray bat roosts in caves year-round. In winter, most gray bats hibernate in vertical (pit) caves with cool, stable temperatures below 10 degrees Celsius. Summer caves, especially those used by maternity colonies, are nearly always located within a kilometer (0.6 mile) of rivers or reservoirs over which bats feed. The summer caves are warm with dome ceilings that trap body heat. Most gray bats migrate seasonally between hibernating and maternity caves, and both types of caves are located in Missouri. Gray bats are active at night, foraging for insects

over water or along shorelines, and they need a corridor of forest riparian cover between roosting caves and foraging areas. They can travel as much as 20 kilometers (12 miles) from their roost caves to forage.

We are concerned about the water quality of Spring Creek, Winsel Creek, and the Bourbouse River due to the presence of many mussel "species of concern". The sheepnose (*Plethobasus cyphyus*), snuffbox (*Plagiola triquetra*), and scaleshell (*Leptodea leptodon*) all occur in the Bourbeuse river near the Highway AF Wells. Mussels are extremely sensitive to pollutants and heavy metals, including pesticides, runoff from agricultural fields, livestock wastes, mine tailings, industrial pollutants, and heavy organic loads from sewage. Again, each of these mussel species currently have no protection under that Endangered Species Act and they are provided here for your information.

If you have not already done so, please contact the Missouri Department of Conservation regarding Missouri species of conservation concern (Planning Division, P.O. Box 180, Jefferson City, Missouri 65102).

Wetlands

Because your letter did not identify the specific site locations, we can only comment on wetlands in general. There are numerous small farm impoundments within the sections identified in your letter. Though these may have wetland characteristics, the Service is primarily concerned with naturally occurring wetlands. Most wetland habitat near these sites can be found along streams and within the floodplains of major rivers. The Service's National Wetland Inventory (NWI) maps are available for all of Missouri and may help you identify wetlands and other aquatic habitats near each site. NWI maps for approximately the northern two-thirds of Missouri are available free of charge in digital form over the Internet at: *http://www.nwi.fws.gov*. You can also order paper NWI maps through the U.S. Geological Survey's Earth Science Information Center (ESIC). For information and NWI map availability, call ESIC's toll free number 1-800-USA-MAPS. Orders and payment for NWI maps in Missouri should be sent to:

USGS/ESIC
Mid Continent Mapping Center
1400 Independence Road, Mail Stop 231
Rolla, Missouri 65401
(573) 308-3500

Thank you for contacting the Service for the opportunity to review this project. Please contact Ms. Kelly Srigley Werner of my staff at (573) 876-1911 ext. 112 if you have further questions or need additional assistance.

Sincerely,

Rick L. Hauser

for R. Mark Wilson
Field Supervisor

Former Hulett Lagoon Site
Combined PA/SI
Reference 60







WELCOME!
MABLE/Geocorr Geographic Correspondence Engine
Version 3.01

[OSEDA Mirror] | [SEDAC Mirror] | [CENSUS Mirror]

This application allows you to access the MABLE geographic data base and to generate custom "correlation lists" as reports and/or files.

Help | Examples | Usage Notes
Output Samples | New in V3 | Articles | Future

This form has 5 main sections. Only the first 2 are required.
Input | Output | Point & Distance | Bounding Box | Geographic Filter

Note: In most of the select-list boxes below you can make multiple selections. Some browsers require that you hold down the ctrl key while clicking before it will recognize multiple selections.

• Input Options

Select state(s) to process. (Limit of 5 states on weekdays, 7 AM - 6 PM)
(Required Option)

Random Pick
ALABAMA
ALASKA
ARIZONA
ARKANSAS
CALIFORNIA
COLORADO
CONNECTICUT
DELAWARE

For background information and help with any of the geographic codes used in the MABLE database (source/target geocodes) consult the file:
• MAGGOT •
(Master Area Geographic Glossary Of Terms)

Select "SOURCE" Geocode(s)	Select "TARGET" Geocode(s)

Entire Universe [no code]	Entire Universe [no code]
---	---
State (1990)	State (1990)
County (1990)	County (1990)
County Subdivision: MCD (1990)	County Subdivision: MCD (1990)
Place: City, Town, Village, etc. (1990)	Place: City, Town, Village, etc. (1990)
Census Tract/BNA (1990)	Census Tract/BNA (1990)
Census Block Group (1990)	Census Block Group (1990)
Census Block (1990) (+)	Census Block (1990) (+)
5-digit Postal ZIP Code (circa 7/1991)	5-digit Postal ZIP Code (circa 7/1991)
---	---
Concentric Ring Pseudo-Geocode (*)	Concentric Ring Pseudo-Geocode (*)
Hydrologic Unit Code: HUC (***)	Hydrologic Unit Code: HUC (***)
---	---
Urban-Rural Portion (1990)	Urban-Rural Portion (1990)
Metro Area: MSA or CMSA (1990)	Metro Area: MSA or CMSA (1990)
Primary MSA: PMSA (1990)	Primary MSA: PMSA (1990)
Urbanized Area: UA (1991)	Urbanized Area: UA (1991)
Congressional District: 102nd (1990)	Congressional District: 102nd (1990)
Congressional District: 103rd (1992)	Congressional District: 103rd (1992)
PUMA: Code A, 5% Sample (PUMS 1990)	PUMA: Code A, 5% Sample (PUMS 1990)

Notes:

+ If you chose census block then you may not choose more than 5 states.

* If you chose "Concentric Ring Pseudo-Geocode" from either list (above) then you **must** specify the "Point and Distance" **or** "Ring Geocode" options below.

** The 95 MSA and PMSA codes are not available in New England. NECMA95 codes are available *only* for New England.

*** Hydrologic Unit Codes are normally 8 digits, but you can specify keeping only the first 2, 4 or 6 (region, subregion and accounting units). These codes not available for Alaska and Hawaii.

- **Digits of Hydrological Unit Codes to keep:** ○ 2 ○ 4 ○ 6 ◉ 8

Weighting Variable:

Specify the weighting variable to use for determining the portion of the source geocodes corresponding to the target geocodes:

Population (1990 census)
Land Area (square km)
Housing Units (1990 census)

☐ Ignore Census Blocks with a value of 0 for the weighting variable.

Output Options

☐ Have weighted centroids calculated and kept on the output file(s)	☐ Generate 2nd allocation factor (AFACT2): portion of *target* geocodes in *source* geocodes	☑ Sort by target geocodes, then source geocodes (default is by source, then target)

You have your choice of 2 output formats: a comma-separated-value (".csv") file **and/or** a report format (".lst") file. For each file you can specify whether you want just the geographic codes, or the codes *and* the names associated with them (where applicable), or just the names.

Comma Separated Value File	Listing File
☑ Generate a CSV file	☑ Generate a listing file
Just Codes (No Names) Codes and Names Just Names (No Codes)	Just Codes (No Names) Codes and Names Just Names (No Codes)
☐ Use tabs (not commas) as delimiter	

- Process time for large areas may be several minutes.

Reset Defaults | Run Request

...following options further limit criteria set above

• Point-and-Distance Options

Specify a point (location) and distance to be used as filter:

Value for radius of Circle **or** radius of largest Ring: 4 (In miles, unless you check ☐ here to specify kilometers.)

(See just below for links to help find coordinates.)

Coordinates of Point: 38.01143 degrees latitude, 92.75471 degrees longitude.

Label of Point: (optional)

Define Ring criteria specifying only one of the following two options:

Either: # of equi-distant rings (integer value between 1 and 10). Radius specified above will be divided by this to derive width of each Ring.

Or: Specify your own custom list of up to 10 ring radii values in ascending order (values must be greater than zero, may be fractional, and largest should equal the radius of the Circle specified above):

#1 0.25 #2 0.5 #3 1 #4 2 #5 3
#6 4 #7 #8 #9 #10

Links are provided here to facilitate obtaining coordinates for your location. See the HELP file

for more detailed information.

- The ETAK Eagle geocoder site lets you enter a street address or street intersection. It displays the coordinates as well as a long list of geographic codes (and will also draw you a map of the area about the point.)
- To get the coordinates of any ZIP code or city use Chris Stuber's Gazetteer
- To view the region of interest try his Tiger Map Server page.
- An alternate site for street addresses or street intersections is the Yahoo Map Server (but you'll need to see the help to find lat-long coordinates).
- View county names on state level maps, check the Census Bureau's Map Stats

Note: If you specify a lat-long location the variable "distance" will be added to your output. This requires that weighted centroids also be calculated (set automatically). The "distance" variable will be between the weighted centroid and the specified Point. If you specify Ring Pseudo-Geocodes then distance and weighted centroid values will *not* be calculated or stored (because weighted centroids of donuts are misleading).

Bounding Box Filter Option

If you want to limit processing to blocks with center points that fall in a specified rectangular area you can enter the coordinates for such a "bounding box" next.

Define the "bounding box" coordinates in decimal degrees:

[ ] Northern-most Latitude [ ] Southern-most Latitude

[ ] Western-most Longitude [ ] Eastern-most Longitude

- Process time for large areas may be several minutes.

Reset Defaults | Run Request

NOTE: *The rest of this form allows you to specify options that will limit the geographic universe to be processed. If you just want to process the entire state(s) that you have selected then you can ignore the rest of this form and submit your request now.*

Geographic Filtering Options

You can specify any or all of 3 types of geography to limit the universe to be processed. You may, for example, only want to see a file with geography for a set of counties, or for a specific metro area (or areas), or possibly for a city (place). You can do so by entering the appropriate FIPS (Federal Information Processing Standard) codes in the text entry boxes that follow. If you need to "look up" the codes you can click on the links to the code-list files in each section.

By default, if you specify more than one kind of geography here then the application assumes that you want to "and" the selections, keeping only areas that satisfy all criteria. For example, if you specified three counties and a metro area, you would only get data based on blocks that were in **both** the counties and the metro area (i.e. the intersection of the selected areas.) To override this default and

choose geographies that satisfy *any* (rather than *all*) of your select criteria -- CLICK HERE: ☐

All selections made below are in addition to the state-level or distance-based filtering which you specified above

County codes . Enter 5-digit FIPS county codes with leading zeroes separated by blanks. You may enter 3-digit codes if you selected only one state. Your output will be limited to the counties specified.
Examples:

- 29189 29510 17163 17119 (selects 4 counties in 2 states)
- 005 017 049 (selects 3 counties from the single state selected)

Metro Area codes. Enter 4-digit FIPS metro area codes with leading zeroes separated by blanks. MSA, CMSA and PMSA codes may be used (4-digit only). The 1990 definitions will be used. Your output will be limited to the metro areas specified. New England NECMA codes can **not** be used.
Examples:

- 3760 1602 (Selects Kansas City MSA and Chicago CMSA)

Place codes. Enter 7-digit FIPS place codes with leading zeroes separated by blanks. You can enter 5-digit codes if only one state has been selected. Your output will be limited to the official city limits of these cities as of the 1990 census.
Examples:

- 70520 70545 70550 53780 06020
  (Saginaw City, Saginaw Township North and South, Midland, Bay City, MI)

- Process time for large areas may be several minutes.

Reset Defaults | Run Request

| Top | SEDAC | UMSL UIC | FTP Archive | DDViewer | Credits | Comments and Suggestions |

Last Update: 09-22-98

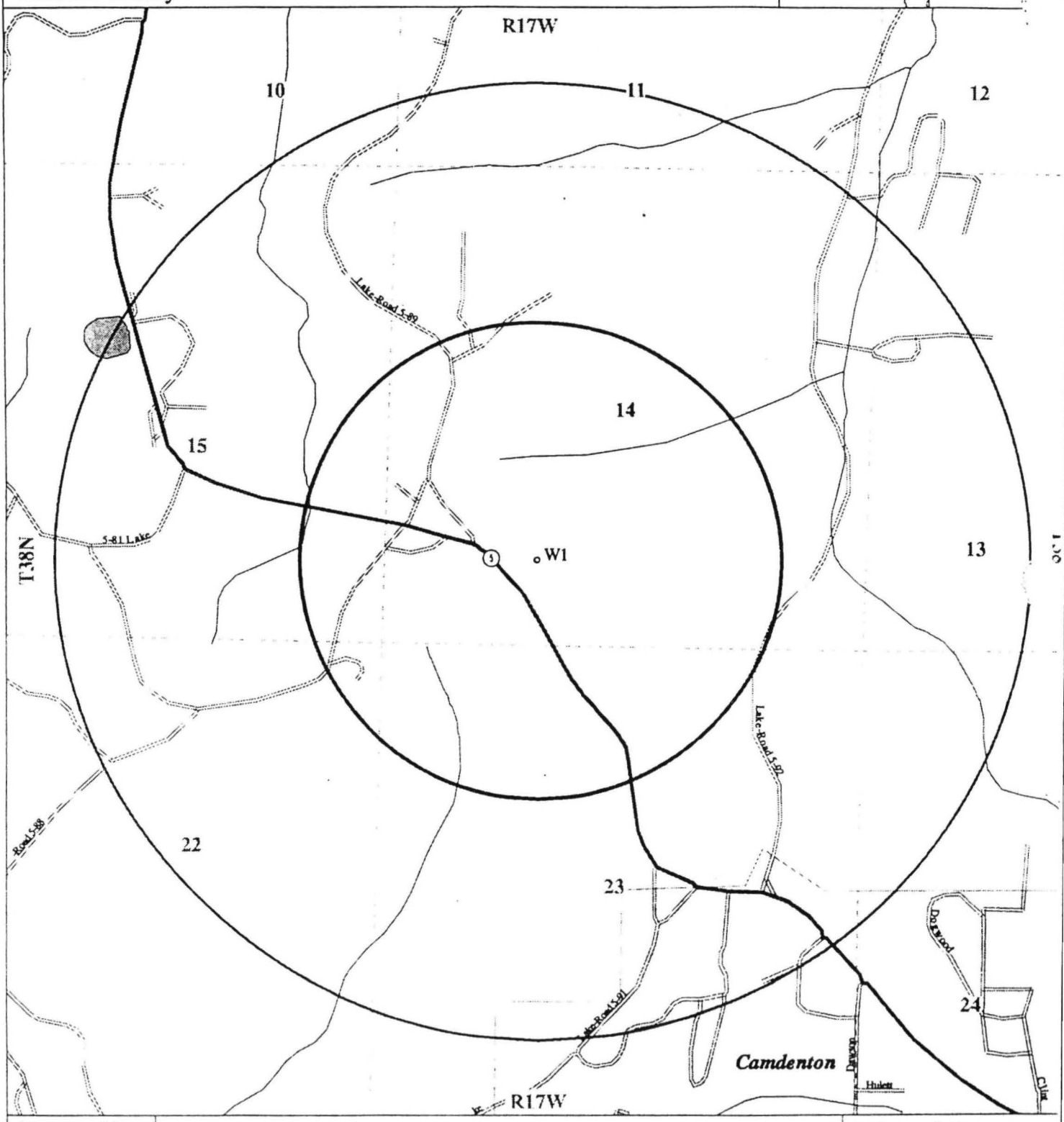
---

geocorr3 3.03 Rev. 99/01/15 / Process: 23822 (OSEDA/UIC, U. of Missouri) - Run 0
Listing of Geographic Correlations

COUNTY	TRACT	RING	POP	AFACT
29029	9505.00	0.25	180	0.053
		0.50	696	0.204
29029	9504.00	1.00	0	0.000
29029	9505.00	1.00	1267	0.371
29029	9504.00	2.00	117	0.167
29029	9505.00	2.00	983	0.288
29029	9508.00	2.00	0	0.000
29029	9503.00	3.00	83	0.311
29029	9504.00	3.00	134	0.191
29029	9505.00	3.00	283	0.083
29029	9506.00	3.00	198	0.391
29029	9508.00	3.00	582	0.561
29029	9503.00	4.00	184	0.689
29029	9504.00	4.00	451	0.642
29029	9505.00	4.00	6	0.002
29029	9506.00	4.00	308	0.609
29029	9508.00	4.00	456	0.439

Windsor Estates Nursing Home
3069006
1 well, 0 contaminant sites, 0 dealerships
Camden County

Former Hulett Lagoon Site
Combined PA/SI
Reference 61



Prepared by
CARES
University of Missouri – Columbia

- Wellhead
- Contaminant Site
- Dealership
- One Mile Buffer
- Half Mile Buffer
- Highway
- Street or Road
- Stream
- U.S. Land Survey
- County Boundary
- Incorporated Area
- Water Body

This map is subject to change as additional information is acquired.
Production Date: October 02, 1996

0 3000
feet

N

Missouri Department of Natural Resources
Division of Environmental Quality
Public Drinking Water Program

Windsor Estates Nursing Home
3069006
1 well

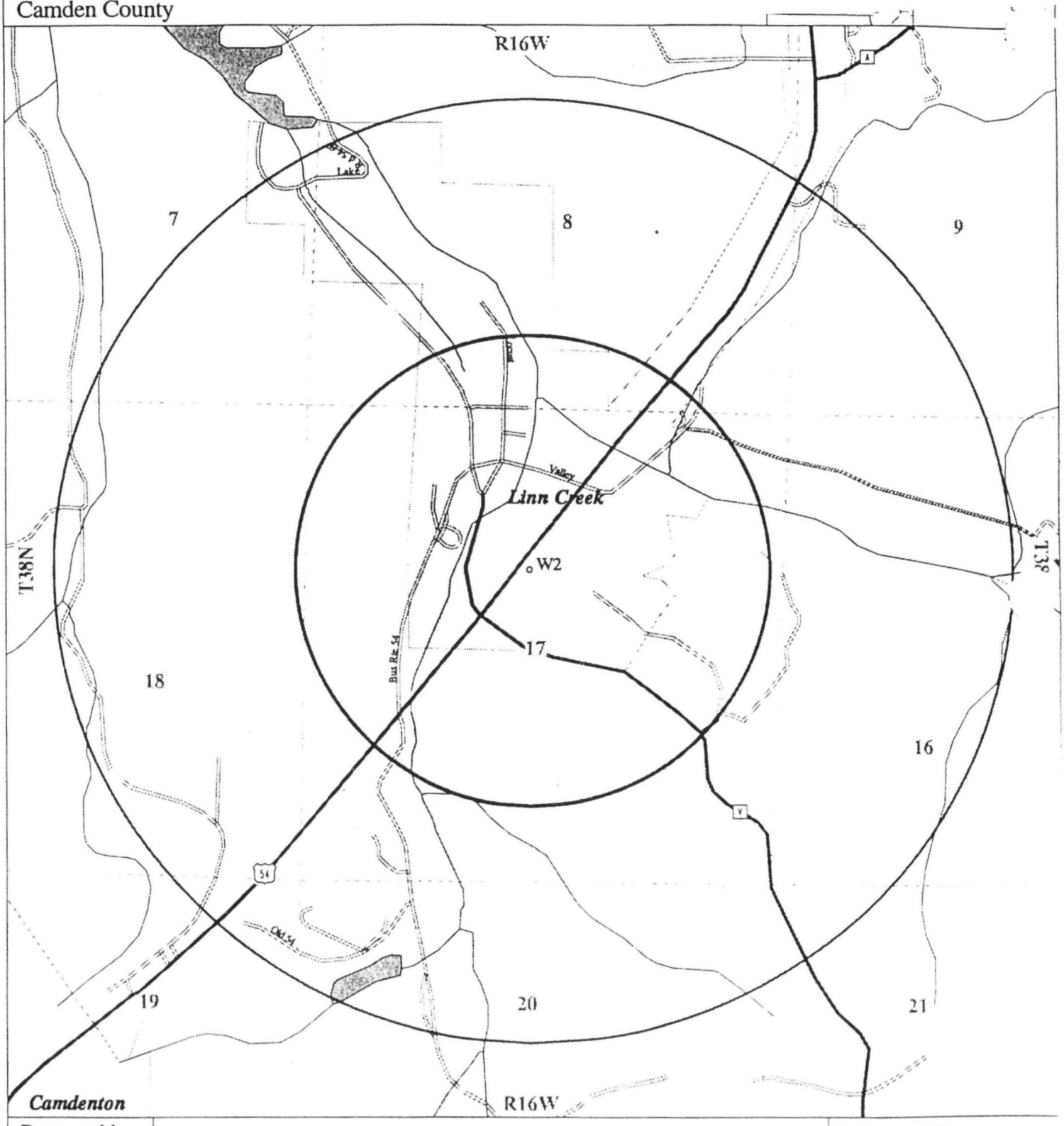
*Temporary DGLS well number. The correct well number is requested.

The information below represents the data currently associated with the water supply layers. The well/intake number corresponds to the well/intake numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is acquired.
Source: Missouri Department of Natural Resources, Public Drinking Water Program.
Production Date: October 02, 1996

Well Number	WI
Extended PWS #	3069006101
Local Well Name	
DGLS Well #	40392*
Latitude	38 1 42.1 N
Longitude	92 46 4.6 W
USGS 7.5 Quadrangle	Green Bay Terrace
County	Camden
DNR Region	Jefferson City
Date Drilled	1969
Material (C/U)	Consolidated
Total Depth (ft)	600.000
Casing Depth (ft)	400.0
Casing Size (in)	6.
Casing Type	
Screen Length (ft)	
Screen Size (in)	
Static Water Level (ft)	165.0
Well Yield (gpm)	
Draw Down Level	
Determination Date	
Yielding Strata	
Pump Type	
Pump Level (ft)	
Capacity (gpm)	
Pump Meter (Y/N)	
Standby Power (Y/N)	
Date Abandoned	
Date Plugged	
VOC detections (Y/N)	N
Nitrate–N Level (mg/l)	N
Chlorination (Y/N)	N
Filtration (Y/N)	N
GWUDISW (Y/N)	
State Approved (Y/N)	

Linn Creek
3010471
1 well, 0 contaminant sites, 0 dealerships
Camden County

Former Hulett Lagoon Site
Combined PA/SI
Reference 62



Prepared by
CARES
University of Missouri – Columbia

- Wellhead
- Contaminant Site
- Dealership
- One Mile Buffer
- Half Mile Buffer
- Highway
- Street or Road
- Stream
- U.S. Land Survey
- County Boundary
- Incorporated Area
- Water Body

This map is subject to change as additional information is acquired.
Production Date: October 02, 1996

0 3000
feet

N

Missouri Department of Natural Resources
Division of Environmental Quality
Public Drinking Water Program

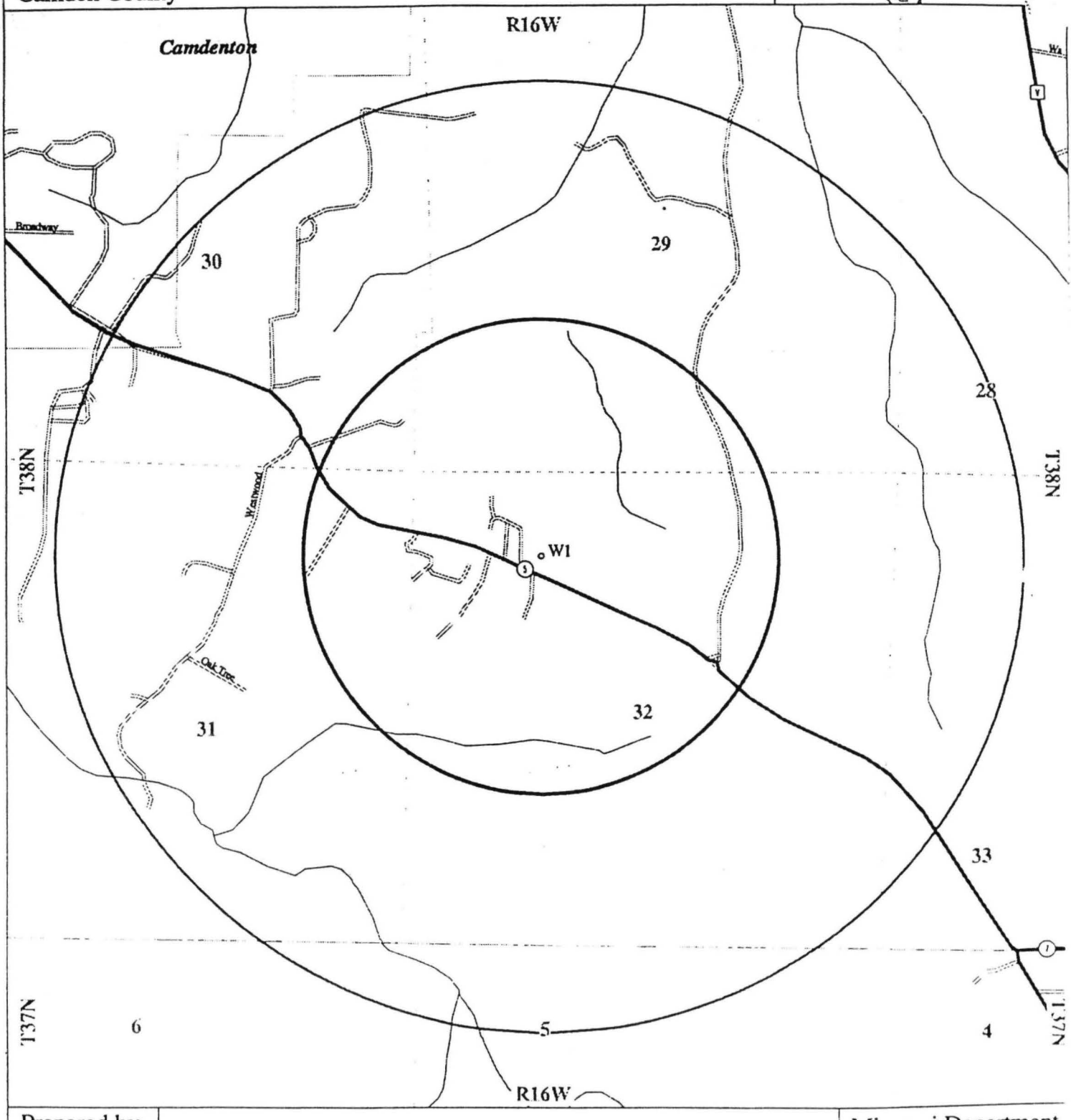
Linn Creek
3010471
1 well

The information below represents the data currently associated with the water supply layers. The well/intake number corresponds to the well/intake numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is acquired.
Source: Missouri Department of Natural Resources, Public Drinking Water Program.
Production Date: October 02, 1996

Well Number	**W2**
Extended PWS #	**3010471102.**
Local Well Name	**Well #2**
DGLS Well #	**28620**
Latitude	38 2 3.7 N
Longitude	92 42 36.2 W
USGS 7.5 Quadrangle	Camdenton
County	Camden
DNR Region	Jefferson City
Date Drilled	**1984**
Material (C/U)	**Consolidated**
Total Depth (ft)	860.000
Casing Depth (ft)	**528.0**
Casing Size (in)	**6.**
Casing Type	**Steel**
Screen Length (ft)	
Screen Size (in)	
Static Water Level (ft)	104.0
Well Yield (gpm)	70
Draw Down Level	125.0
Determination Date	1983
Yielding Strata	
Pump Type	
Pump Level (ft)	294
Capacity (gpm)	10
Pump Meter (Y/N)	
Standby Power (Y/N)	N
Date Abandoned	
Date Plugged	
VOC detections (Y/N)	Y
Nitrate–N Level (mg/l)	N
Chlorination (Y/N)	N
Filtration (Y/N)	N
GWUDISW (Y/N)	
State Approved (Y/N)	

Southway Terrace MHP
3048141
1 well, 0 contaminant sites, 0 dealerships
Camden County

Former Hulett Lagoon Site
Combined PA/SI
Reference 63



Prepared by
CARES
University of Missouri – Columbia

- Wellhead
- Contaminant Site
- Dealership
- One Mile Buffer
- Half Mile Buffer
- Highway
- Street or Road
- Stream
- U.S. Land Survey
- County Boundary
- Incorporated Area
- Water Body

This map is subject to change as additional information is acquired.
Production Date: October 02, 1996

0 3000
feet

N

Missouri Department of Natural Resources
Division of Environmental Quality
Public Drinking Water Program

Southway Terrace MHP
3048141
1 well

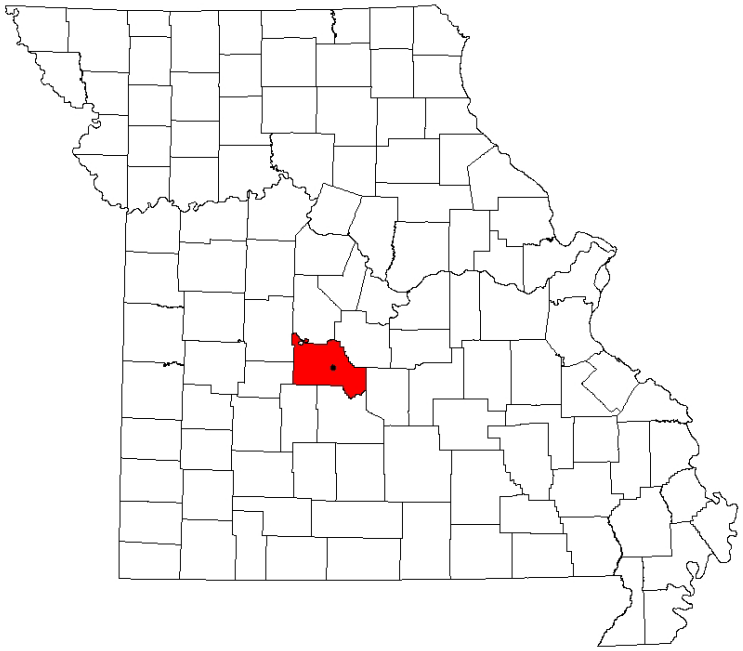
The information below represents the data currently associated with the water supply layers. The well/intake number corresponds to the well/intake numbers depicted on the accompanying map. Blanks indicate missing data. This table is subject to change as additional information is acquired.
Source: Missouri Department of Natural Resources, Public Drinking Water Program.
Production Date: October 02, 1996

Well Number	W1
Extended PWS #	3048141101
Local Well Name	
DGLS Well #	26629
Latitude	37 59 35.2 N
Longitude	92 42 56.5 W
USGS 7.5 Quadrangle	Decaturville
County	Camden
DNR Region	Jefferson City
Date Drilled	1970
Material (C/U)	Consolidated
Total Depth (ft)	550.000
Casing Depth (ft)	350.0
Casing Size (in)	6.
Casing Type	Steel
Screen Length (ft)	
Screen Size (in)	
Static Water Level (ft)	175.0
Well Yield (gpm)	
Draw Down Level	
Determination Date	
Yielding Strata	
Pump Type	Submersible
Pump Level (ft)	
Capacity (gpm)	
Pump Meter (Y/N)	
Standby Power (Y/N)	
Date Abandoned	
Date Plugged	
VOC detections (Y/N)	N
Nitrate–N Level (mg/l)	N
Chlorination (Y/N)	N
Filtration (Y/N)	N
GWUDISW (Y/N)	N
State Approved (Y/N)	Y

PRE-CERCLA SCREENING REPORT

Dawson Metal Products Camdenton Facility #2 Site
Camden County, Missouri

September 6, 2017



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Attachment A: Pre-CERCLA Screening Checklist/Decision Form

This form is used in conjunction with a site map and any additional information required by the EPA Region to document completion of a Pre-CERCLA Screening (PCS). The form includes a decision on whether a site should be added to the Superfund program's active site inventory for further investigation. Select from available dropdown values for fields marked with an asterisk *.

Region: 7 State/Territory: MO Tribe: _____ _____
Click here for the EPA Tribe Entity Mapping spreadsheet. EPA ID No. (If Available)

Site Name: Dawson Metal Products Camdenton Facility #2
Other Site Name(s): _____

Site Location: 1225 West U.S. Highway 54
(Street)

3	Camdenton	Camden	MO	65020 +
Congressional District	(City)	(County)	(State / Terr)	(Zip+4)

If no street address is available: _____ (Township-Range) _____ (Section)

Checklist Preparer:
Amanda Branson (Name / Title) 09/06/2017 (Date)
Missouri Department of Natural Resources (MoDNR) (Organization) (573) 751-9021 (Phone)
1730 East Elm Street (Street) amanda.branson@dnr.mo.gov (Email)

Jefferson City	Cole	MO	65101 + 4130
(City)	(County)	(State / Terr)	(Zip+4)

Site Contact Info/Mailing Address: Owner: Jack Dickerson, Dickerson Building LLC
12 Willow Creek Road, Camdenton, Mo 65020 (573) 346-2279

CERCLA 105d Petition for Preliminary Assessment? Yes — If Yes, Petition Date (mm/dd/yyyy): _____
RCRA Subtitle C Site Status: Is site in RCRAInfo? No — If Yes, RCRAInfo Handler ID #: _____
Ownership Type*: Private — Additional RCRAInfo ID #(s): _____
Site Type*: Manufacturing/Processing/Maintenance — State ID #(s): _____
Site Sub-Type*: Chemicals & allied products — Other ID #(s): _____
Federal Facility? No — Federal Facility Owner*: (Make selection)
Formerly Used Defense Site (FUDS)? No — Federal Facility Operator*: (Make selection)
Federal Facility Docket? No — If Yes, FF Docket Listing Date (mm/dd/yyyy): _____
Federal Facility Docket Reporting Mechanism*: (Make selection)
Native American Interest? No — If Yes, list Tribe: _____
Additional Tribe (s): _____

Attachment A: Pre-CERCLA Screening Checklist/Decision Form

Site Description

Use this section to briefly describe site background and conditions if known or (easily) available, such as: operational history; physical setting and land use; site surface description, soils, geology and hydrogeology; source and waste characteristics; hazardous substances/contaminants of concern; historical releases, previous investigations and cleanup activities; previous regulatory actions, including permitting and enforcement actions; institutional controls; and community interest.

Insert text here (if text exceeds size of text box, view all text on page 5):

On June 16, 2017, the Missouri Department of Natural Resources (MoDNR), Hazardous Waste Program (HWP), Superfund Site Assessment Unit (SAU) was contacted by the United States Environmental Protection Agency (EPA) Region 7 regarding a phone call the Region received from Mrs. Carolyn Burns, a Camdenton citizen, concerned about trichloroethene (TCE) contamination and potential buried drum disposal in Camdenton (EPA, 2017). MoDNR staff contacted Mrs. Burns on June 20, 2017. Mrs. Burns explained that she worked for 28 years at the Dawson Metal Products facility located at 221 Sunset Drive in Camdenton. The facility began manufacturing air conditioning coils and feeder parts from aluminum and copper tubing in 1967. Historical manufacturing processes required vapor degreasing to remove oil and dirt from the various parts and assembled units. Over the operational history of the facility, several different solvents were used in the vapor degreasers, including TCE, 1,1,1-trichlorothane (1,1,1-TCA)

Geospatial Information

Latitude: + 37.998918 (Decimal Degree North (e.g., +38.859156))

Longitude: - 92.763290 (Decimal Degree West (e.g., -77.036783))

Provide 4 significant digits at a minimum, more if your collection method generates them.

Except for certain territories in the Pacific Ocean, all sites in U.S. states and territories are located within the northern and western hemispheres and will have a positive latitude sign and negative longitude sign. The coordinate signs should be changed as necessary for sites in the southern and/or eastern hemispheres.

Point Description: Select the option below that best represents the site point for future reference and to distinguish it from any nearby sites.

- ☐ Geocoded (address-matched) Site Address
- ☐ Site Entrance (approximate center of curb-cut)
- ☐ Approximate Center of Site
- ☒ Other Distinguishing Site Feature (briefly describe below):

Point was placed at alleged TCE disposal area.

Point Collection Method: Check the method used to collect the coordinates above and enter the date of collection.

- ☐ Online Map Interpolation
- ☒ GPS (handheld, smartphone, other device or technology with accuracy range < 25 meters)
- ☐ GPS Other (accuracy range is ≥ 25 meters or unspecified)
- ☐ Address Matching: Urban
- ☐ Address Matching: Rural
- ☐ Other Method: _____

Collection Date (mm/dd/yyyy): 08/23/2017

POINT-SELECTION CONSIDERATIONS

- Often the best point is a feature associated with the environmental release or that identifies the site visually.
- Use the curb cut of the entrance to the site if there is a clear primary entrance and it is a good identifier for the overall location.
- The approximate center of the site (a guess at the centroid) is useful for large-area sites or where there are no appropriate distinguishing features.
- Use the geocoded address if that is the only or best option available, but if possible use something more representative for sites larger than 50 acres.

Attachment A: Pre-CERCLA Screening Checklist/Decision Form

Complete this checklist to help determine if a site should be added to the Superfund Active site inventory. See Section 3.6 of the PCS guidance for additional information.	YES	NO	Unknown
1. An initial search for the site in EPA's Superfund active, archive and non-site inventories should be performed prior to starting a PCS. Is this a new site that does not already exist in these site inventories?	☒	☐	☐
2. Is there evidence of an actual release or a potential to release?	☒	☐	☐
3. Are there possible targets that could be impacted by a release of contamination at the site?	☒	☐	☐
4. Is there documentation indicating that a target has been exposed to a hazardous substance released from the site?	☐	☐	☒
5. Is the release of a naturally occurring substance in its unaltered form, or is it altered solely through naturally occurring processes or phenomena, from a location where it is naturally found?	☐	☒	☐
6. Is the release from products which are part of the structure of, and result in exposure within, residential buildings or business or community structures?	☐	☒	☐
7. If there has been a release into a public or private drinking water supply, is it due to deterioration of the system through ordinary use?	☐	☒	☐
8. Are the hazardous substances possibly released at the site, or is the release itself, excluded from being addressed under CERCLA?	☐	☒	☐
9. Is the site being addressed under RCRA corrective action or by the Nuclear Regulatory Commission?	☐	☒	☐
10. Is another federal, state, tribe or local government environmental cleanup program other than site assessment actively involved with the site (e.g., state voluntary cleanup program)?	☐	☒	☐
11. Is there sufficient documentation or evidence that demonstrates there is no likelihood of a significant release that could cause adverse environmental or human health impacts?	☐	☒	☐
12. Are there other site-specific situations or factors that warrant further CERCLA remedial/integrated assessment or response?	☐	☒	☐

Attachment A: Pre-CERCLA Screening Checklist/Decision Form

Preparer's Recommendation: ☒ **Add** site to the Superfund active site inventory.

☐ **Do not add** site to the Superfund active site inventory.

Please explain recommendation below:

PCS Summary and Decision Rationale

Use this section to summarize PCS findings and support the decision to add or not add the site to the Superfund active site inventory for further investigation. Information does not need to be specific but, where known, can include key factors such as source and waste characteristics (e.g., drums, contaminated soil); evidence of release or potential release; threatened targets (e.g., drinking water wells); key sampling results (if available); CERCLA eligibility; involvement of other cleanup programs; and other supporting factors.

Insert text here (if text exceeds size of text box, view all text on page 6):

Based on descriptions provided by former employees of the degreasing and disposal operations that took place at the DMPF #2 building from July 1972 through 1973, a substantial mass of TCE may have been released directly to the ground surface infiltrating to soil and groundwater at the site. Former Dawson employees indicate that one half of a 55-gallon drum of TCE was disposed of per shift, with two shifts running six days a week. It is therefore possible that as much as 17,000 gallons of waste TCE may have been released into the environment over the course of the year. The DMPF #2 building (with building additions) is currently used as a fishing tackle distribution facility with 21 employees. There is concern about potential intrusion of TCE vapor into the building as a result of the historic releases at the facility.

There is limited data on the geology and hydrogeology at this specific site location. However, data available from the

Site Assessor: Amanda Branson Amanda Branson 09/06/2017 09/06/2017
Print Name/Signature Date

EPA Regional Review and Pre-CERCLA Screening Decision

Add site to the Superfund active site inventory for completion of a:

- ☐ Standard/full preliminary assessment (PA)
- ☐ Abbreviated preliminary assessment (APA)
- ☐ Combined preliminary assessment/site inspection (PA/SI)
- ☐ Integrated removal assessment and preliminary assessment
- ☐ Integrated removal assessment and combined PA/SI
- ☐ Other: _____

Do not add site to the Superfund active site inventory. Site is:

- ☐ Not a valid site or incident
- ☐ Being addressed by EPA's removal program
- ☐ Being addressed by a state cleanup program
- ☐ Being addressed by a tribal cleanup program
- ☐ Being addressed under the Resource Conservation and Recovery Act
- ☐ Being addressed by the Nuclear Regulatory Commission
- ☐ Other: _____

EPA Regional Reviewer: _____ _____
Print Name/Signature Date

Site Description

(All text as entered on page 2)

On June 16, 2017, the Missouri Department of Natural Resources (MoDNR), Hazardous Waste Program (HWP), Superfund Site Assessment Unit (SAU) was contacted by the United States Environmental Protection Agency (EPA) Region 7 regarding a phone call the Region received from Mrs. Carolyn Burns, a Camdenton citizen, concerned about trichloroethene (TCE) contamination and potential buried drum disposal in Camdenton (EPA, 2017). MoDNR staff contacted Mrs. Burns on June 20, 2017. Mrs. Burns explained that she worked for 28 years at the Dawson Metal Products facility located at 221 Sunset Drive in Camdenton. The facility began manufacturing air conditioning coils and feeder parts from aluminum and copper tubing in 1967. Historical manufacturing processes required vapor degreasing to remove oil and dirt from the various parts and assembled units. Over the operational history of the facility, several different solvents were used in the vapor degreasers, including TCE, 1,1,1-trichlorothane (1,1,1-TCA) and methylene chloride. Dawson Metal Products began operations in 1967 and was later bought by Sundstrand Tubular Products in 1973. Modine Heat Transfer purchased the Sundstrand Tubular Products business on August 24, 1990 and conducted operations at the 221 Sunset Drive facility until March 2012. The facility at 221 Sunset Drive is currently being investigated and remediated with oversight by MoDNR's Resource Conservation and Recovery Act (RCRA) Section (EPA ID #MOD062439351).

Mrs. Burns described a temporary change in location for company operations following a fire at the 221 Sunset Drive location in 1972. She stated that after the fire, a portion of the company's operations were moved to a building located at 1225 W U.S. Highway 54, known at the time as the Cox building (hereafter referred to as Dawson Metal Products Facility [DMPF] #2). The company operated at the DMPF #2 building for approximately one year until returning all operations to the Sunset Drive facility. Ms. Burns stated that workers at the DMPF #2 building were instructed to dispose of used TCE from the makeshift degreasing station by pouring it directly onto the ground surface outside a loading dock door (MoDNR, 2017A). Ms. Burns' statements have been corroborated by two other former employees, Mr. Jerry Rogers and Mr. James McGuire. Mr. Rogers worked the makeshift degreasing station in the DMPF #2 building and stated that it was standard practice to dispose of the waste TCE onto the ground outside the loading dock door when it was no longer useful in the degreasing process (MoDNR, 2017B).

According to the Camden County Assessor's Online GIS webpage, the property at 1225 W U.S. Highway 54 is 11 acres in size with a 78,000 square foot warehouse (DMPF #2 building). The property is bordered by a forested area on the northeast and northwest sides, Camden Mini Storage Company on the southwest side, and U.S. Highway 54 on the southeast side of the parcel. Site access is restricted on the south/southeastern portion of the property by a fence with a gate that is locked by staff after business hours. The property is currently owned by Dickerson Building, LLC and occupied by the Laker Fishing Tackle Company who rents the building from Dickerson (CMDN, 2017). Laker Fishing Tackle has been in operation at this location since 2002 and currently employs 21 people. The nearest residence is 300 feet to the west of the site. Surrounding land use includes commercial and residential properties.

PCS Summary and Decision Rationale

(All text as entered on page 4)

Based on descriptions provided by former employees of the degreasing and disposal operations that took place at the DMPF #2 building from July 1972 through 1973, a substantial mass of TCE may have been released directly to the ground surface infiltrating to soil and groundwater at the site. Former Dawson employees indicate that one half of a 55-gallon drum of TCE was disposed of per shift, with two shifts running six days a week. It is therefore possible that as much as 17,000 gallons of waste TCE may have been released into the environment over the course of the year. The DMPF #2 building (with building additions) is currently used as a fishing tackle distribution facility with 21 employees. There is concern about potential intrusion of TCE vapor into the building as a result of the historic releases at the facility.

There is limited data on the geology and hydrogeology at this specific site location. However, data available from the Modine Manufacturing site located at 221 Sunset Drive, approximately 0.75 miles to the north, indicates that bedrock in the region is comprised of Cambrian and Ordovician Age dolomite, cherty dolomite, and sandstone. Surface soil in the area has been classified as residual, alluvial, and colluvial. The Missouri Geological Survey (MGS) has reclassified the units in the region into easily recognizable characteristics as follows: alluvium, residuum loess (gentle slopes), residuum loess (steep slopes), and residuum colluvium (bedrock). According to MGS, there are no confining units below the site or in the region. Overlying loess allows for rapid infiltration (JEGI, 1992). TCE is a dense no-aqueous phase liquid (DNAPL). It is likely that TCE disposed onto the ground surface presents a risk to groundwater below the site.

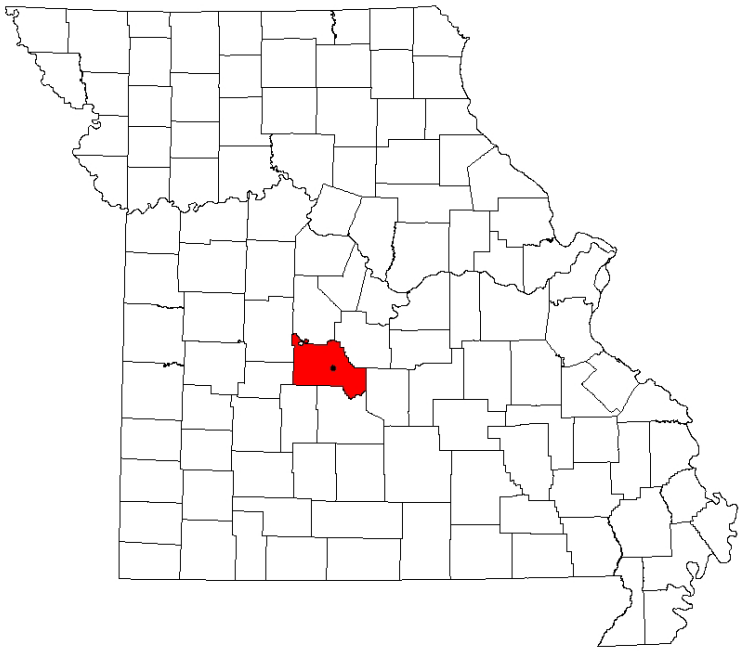
MGS databases have a record of 9 public drinking water wells and 65 private drinking water wells within 1.5 miles of the DMPF #2 site. The City of Camdenton obtains drinking water from three public groundwater wells: North Rodeo Well #8, Blair Heights Well #4, and Hickory Well #7. The nearest public well is the Blair Heights well, drilled in 1974 to a total depth of 1,045 feet. The Blair Heights well has a steel casing to a depth of 400 feet and produces water at a rate of 100 gallons per minute. The Mulberry Well, which was a former public drinking water supply well in Camdenton, is located 600 feet southeast of the 221 Sunset Drive location and produces water at the rate of 600 gallons per minute. MoDNR detected TCE above the Maximum Contaminant Level (MCL) of 5 ug/L for the first time in the Mulberry Well in February 1998. The City of Camdenton took the Mulberry Well off line in February 1999. The Mulberry Well is no longer connected to the city's water supply system and is not used for drinking water. Contamination in the Mulberry Well is being investigated and remediated with state oversight under the site name Former Hulett Lagoon (EPA ID #MOSFN0703530).

Based on the available information, there is a threat of release of TCE into the environment. MoDNR recommends entry onto the Superfund Active Site Inventory and further assessment under CERCLA.

ABBREVIATED PRELIMINARY ASSESSMENT REPORT

Dawson Metal Products Camdenton Facility #2 Site
Camden County, Missouri

September 8, 2017



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

ABBREVIATED PRELIMINARY ASSESSMENT CHECKLIST

This checklist can be used to help the site investigator determine if an Abbreviated Preliminary Assessment (APA) is warranted. This checklist should document the rationale for the decision on whether further steps in the site investigation process are required under CERCLA. Use additional sheets, if necessary.

Checklist Preparer: Amanda Branson, Missouri Department of Natural Resources			
Title: Project Manager, Site Assessment Unit, Superfund Section		**Date:** 9/8/17	
Address: P.O. Box 176			
City: Jefferson City		**State:** MO	**Zip:** 65102
Telephone: 573-751-9021	**E-mail Address:** amanda.branson@dnr.mo.gov		
Site Name: Dawson Metal Products Camdenton Facility (DMPF) #2			
Alias:			
Address or other Location Identifier: 1225 West U.S. Highway 54			
City: Camdenton	**County:** Camden	**State:** MO	**Zip:** 65020
Latitude: 37.998608		**Longitude:** -92.763877	

Describe the release (or potential release) and its probable nature:

On June 16, 2017, the Missouri Department of Natural Resources (MoDNR), Hazardous Waste Program (HWP), Superfund Site Assessment Unit (SAU) was contacted by the United States Environmental Protection Agency (EPA) Region 7 regarding a phone call the Region received from Mrs. Carolyn Burns, a Camdenton citizen, concerned about trichloroethene (TCE) contamination and potential buried drum disposal in Camdenton (EPA, 2017). MoDNR staff contacted Mrs. Burns on June 20, 2017. Mrs. Burns explained that she worked for 28 years at the Dawson Metal Products facility located at 221 Sunset Drive in Camdenton. The facility began manufacturing air conditioning coils and feeder parts from aluminum and copper tubing in 1967. Historical manufacturing processes required vapor degreasing to remove oil and dirt from the various parts and assembled units. Over the operational history of the facility, several different solvents were used in the vapor degreasers, including TCE, 1,1,1-trichlorothane (1,1,1-TCA) and methylene chloride. Dawson Metal Products began operations in 1967 and was later bought by Sundstrand Tubular Products in 1973. Modine Heat Transfer purchased the Sundstrand Tubular Products business on August 24, 1990 and conducted operations at the 221 Sunset Drive facility until March 2012. The facility at 221 Sunset Drive is currently being investigated and remediated with oversight by MoDNR's Resource Conservation and Recovery Act (RCRA) Section (EPA ID #MOD062439351).

Mrs. Burns described a temporary change in location for company operations following a fire at the 221 Sunset Drive location in 1972. She stated that after the fire, a portion of the company's operations were moved to a building located at 1225 W U.S. Highway 54, known at the time as the Cox building (hereafter referred to as Dawson Metal Products Facility [DMPF] #2). The company operated at the DMPF #2 building for approximately one year until returning all operations to the Sunset Drive facility. Ms. Burns stated that workers at the DMPF #2 building were instructed to dispose of used TCE from the makeshift degreasing station by pouring it directly onto the ground surface outside a loading dock door (MoDNR, 2017A). Ms. Burns' statements have been corroborated by two other former employees, Mr. Jerry Rogers and Mr. James McGuire. Mr. Rogers worked the makeshift degreasing station in the DMPF #2 building and stated that it was standard practice to dispose of the waste TCE onto the ground outside the loading dock door when it was no longer useful in the degreasing process (MoDNR, 2017B and MoDNR, 2017C).

Based on descriptions provided by former employees of the degreasing and disposal operations that took place at the DMPF #2 building from July 1972 through 1973, a substantial mass of TCE may have been

released directly to the ground surface infiltrating to soil and groundwater at the site (MoDNR, 2017D). Former Dawson employees indicate that one half of a 55-gallon drum of TCE was disposed of per shift, with two shifts running six days a week. It is therefore possible that as much as 17,000 gallons of waste TCE may have been released into the environment over the course of the year. The DMPF #2 building (with building additions) is currently used as a fishing tackle distribution facility with 21 employees. There is concern about potential intrusion of TCE vapor into the building as a result of the historic releases at the facility.

Part 1 – Superfund Eligibility Evaluation

If all answers are "no", go on to Part 2, otherwise proceed to Part 3.

1. Is the site currently in CERCLIS or an "alias" of another site? **Yes** ___ **No** X

Explain:
The site is not currently in CERCLIS or an "alias" of another site.

2. Is the site being addressed by some other remedial program (Federal, State, or Tribal)? **Yes** ___ **No** X

Explain:
No, this site is not currently addressed by a different program.

3. Are the hazardous substances potentially released at the site regulated under a statutory exclusion (e.g., petroleum, natural gas, natural gas liquids, synthetic gas usable for fuel, normal application of fertilizer, release located in a workplace, naturally occurring, or regulated by the NRC, UMTRCA, or OSHA) ? **Yes** ___ **No** X

(Revised by Missouri DNR 9/26/2013)

Explain:

4. Are the hazardous substances potentially releases at the site excluded by policy considerations (i.e., deferred to RCRA corrective action)? **Yes** ___ **No** X

Explain:

5. Is there sufficient documentation to demonstrate that no potential for a release that could cause adverse environmental or human health impacts exists (e.g., comprehensive remedial investigation equivalent data showing no release above ARARs, completed removal action, documentation showing that no hazardous substance releases have occurred, or an EPA approved risk assessment completed)? **Yes** ___ **No** X

Explain:
There is a potential for release that could cause both adverse environmental and/or human health impacts.

(Revised by Missouri DNR 9/26/2013)

(Revised by Missouri DNR 9/27/02)

ABBREVIATED PRELIMINARY ASSESSMENT CHECKLIST

Part 2 – Initial Site Evaluation

If information is not available to make a "yes" or "no" response, further investigation may be needed. In these cases, determine whether and APA is appropriate. Exhibit 1 parallels the questions in Part 2.

1. Does the site have a release or a potential to release? **Yes** X **No** ___

Explain:

Based on descriptions provided by former employees of the degreasing and disposal operations that took place at the DMPF #2 building from July 1972 through 1973, a substantial mass of TCE may have been released directly to the ground surface infiltrating to soil and groundwater at the site. Former Dawson employees indicate that one half of a 55-gallon drum of TCE was disposed of per shift, with two shifts running six days a week. It is therefore possible that as much as 17,000 gallons of waste TCE may have been released into the environment over the course of the year. The DMPF #2 building (with building additions) is currently used as a fishing tackle distribution facility with 21 employees. There is concern about potential intrusion of TCE vapor into the building as a result of the historic releases at the facility.

2. Does the site have uncontained sources containing CERCLA eligible substances? **Yes** X **No** __

Explain:

Yes, there is a potential that unknown and uncontained quantities of TCE are located at the site. TCE is a CERCLA eligible substance.

3. Does the site have documented on-site, adjacent, or nearby targets? **Yes** X **No** ___

(Revised by Missouri DNR 9/26/2013)

Explain:

There are 9 public drinking water wells and 65 private wells within 1.5 miles of the DMPF #2 site. Based on these factors, there is concern that past releases of TCE to the subsurface at the site may pose a threat to groundwater/drinking water. There are 21 employees at the Laker Fishing Tackle Company. There is concern about potential intrusion of TCE vapor into the DMPF #2 building as a result of the historic releases at the facility

If the answers to questions 1, 2, and 3 were all "yes", then answer the questions below before proceeding to Part 3.

4. Does documentation indicate that a target (e.g. drinking water wells, drinking surface water intakes, etc.) has been exposed to a hazardous substance released from the site? **Yes** X **No** __

Explain:

There are 9 public drinking water wells and 65 private wells within 1.5 miles of the DMPF #2 site. Based on these factors, there is concern that past releases of TCE to the subsurface at the site may pose a threat to groundwater/drinking water.

ABBREVIATED PRELIMINARY ASSESSMENT CHECKLIST

5. Is there an apparent release at the site with no documentation of exposed targets, but there are targets on site or immediately adjacent to the site? **Yes** X **No** ___

Explain:

Yes, there is an potential release of TCE at the site. No sampling has been done of private wells within the 1 mile radius of the site. Workers at the facility have the potential for being an exposed target to potentially contaminated indoor air and/or sub-surface air.

6. Is there an apparent release and no documented on-site targets or targets immediately adjacent to the site, but there are nearby targets (e.g. targets within 1 mile)? **Yes** ___ **No** X

Explain:

Yes, there are targets immediately adjacent to the site and nearby targets.

7. Is there no indication of a hazardous substance release, and there are uncontained sources containing CERCLA hazardous substances, but there is a potential to release with targets present on site or in proximity to the site? **Yes** ___ **No** X

Explain:

There is a hazardous substance release of TCE from uncontained sources throughout the shipping door area of Dawson Metal Products Facility.

(Revised by Missouri DNR 9/26/2013)

ABBREVIATED PRELIMINARY ASSESSMENT CHECKLIST

Part 3 – EPA Site Assessment Decision

When completing Part 3, use Part 2 and Exhibit 1 to select the appropriate decision. For example, if the answer to question 1 in Part 2 was "no", then an APA may be performed and the "NFRAP" box below should be checked. Additionally, if the answer to question 4 in Part 2 is "yes," then you have two options (as indicated in Exhibit 1): Option 1 – conduct an APA and check the "Lower Priority SI' or "Higher Priority SI" box below; or Option 2 – proceed with a combined PA/SI assessment.

Check the box that applies based on the conclusions of the APA:

☐	**NFRAP**	☐	**Refer to Removal Program – further site assessment needed**
X	**Higher Priority SI**	☐	**Refer to Removal Program – NFRAP**
☐	**Lower Priority SI**	☐	**Site is being addressed as part of another CERCLIS site**
☐	**Defer to RCRA Subtitle C**	☐	**Other:**
☐	**Defer to NRC**		

Explain rationale for your decision:

Based on descriptions provided by former employees of the degreasing and disposal operations that took place at the DMPF #2 building from July 1972 through 1973, a substantial mass of TCE may have been released directly to the ground surface infiltrating to soil and groundwater at the site. Former Dawson employees indicate that one half of a 55-gallon drum of TCE was disposed of per shift, with two shifts running six days a week. It is therefore possible that as much as 17,000 gallons of waste TCE may have been released into the environment over the course of the year. The DMPF #2 building (with building additions) is currently used as a fishing tackle distribution facility with 21 employees. There is concern about potential intrusion of TCE vapor into the building as a result of the historic releases at the facility.

There is little data on the geology and hydrogeology at the specific site location. However, data available from the Modine Manufacturing site located at 221 Sunset Drive, approximately 0.75 miles to the north indicates that bedrock in the region is comprised of Cambrian and Ordovician Age dolomite, cherty dolomite, and sandstone. Surface soil in the area has been classified as residual, alluvial, and colluvial. The Missouri Geological Survey (MGS) has reclassified the units in the region into easily recognizable characteristics as follows: alluvium, residuum loess (gentle slopes), residuum loess (steep slopes), and residuum colluvium (bedrock). According to MGS, there are no confining units below the site or in the region. Overlying loess allows for rapid infiltration. (JEGI, 1992)

The City of Camdenton obtains drinking water from three public groundwater wells: North Rodeo Well #8, Blair Heights Well #4, and Hickory Well #7. The nearest public well is the Blair Heights well, drilled in 1974 to a total depth of 1,045 feet. The Blair Heights well has a steel casing to a depth of 400 feet. The Mulberry Well, which was a public drinking water well in Camdenton, is located 600 feet southeast of the 221 Sunset Drive location. The Mulberry Well became contaminated with TCE in March 1993 and was taken offline in 1999. The Mulberry Well is no longer connected to the city's water supply system and is not used for drinking water. Contamination in the Mulberry Well is being investigated and remediated under state oversite as the site name Former Hulett Lagoon (EPA ID # MOSFN0703530).

ABBREVIATED PRELIMINARY ASSESSMENT CHECKLIST

There are 9 public drinking water wells and 65 private wells within 1.5 miles of the DMPF #2 site. Based on these factors, there is concern that past releases of TCE to the subsurface at the site may pose a threat to groundwater/drinking water.

Based on the available information, there is a threat of release of TCE into the environment. MoDNR recommends further CERCLA assessment at the site. Site Inspection sampling is recommended to determine whether there has been a release of TCE at the site with appropriate exposure pathway sampling included.

PREPARED BY:
NAME: Amanda Branson **SIGNATURE:** Amanda Branson **DATE:** 09/08/17

APPROVED BY:
NAME: Valerie Wilder **SIGNATURE:** Valerie Wilder **DATE:** 09/08/17

(Revised by Missouri DNR 9/26/2013)

(Revised by Missouri DNR 9/27/02)

ABBREVIATED PRELIMINARY ASSESSMENT CHECKLIST

EXHIBIT 1
SITE ASSESSMENT DECISION GUIDELINES FOR A SITE

Exhibit 1 identifies different documented site conditions (column 1) that may apply to the site under investigation. The Exhibit is used only as a reference to assist with completing Part 3 of the APA Form; do not circle any boxes. To use the Exhibit, determine whether the conditions apply to the site and then examine the corresponding investigation type options in the columns to the right. Note that if site conditions 1, 2 or 3 exist at the site, the APA would be completed and site NFRAP'ed. If any of the other conditions apply, some form of further CERCLA assessment would be conducted.

Suspected/Documented Site Conditions		**Investigation Type Options**			
		APA	**Full PA**	**PA/SI**	**SI**
1. There are no releases or potential to release.					
2. No uncontained sources with CERCLA-eligible substances are present on site.					
3. There are no on-site, adjacent, or nearby targets.					
4. There is documentation indicating that a target (e.g. drinking water wells, drinking surface water intakes, etc.) has been exposed to a hazardous substance released from the site.	Option 1: APA → SI				
	Option 2: PA/SI				
5. There is an apparent release at the site with no documentation of exposed targets, but there are targets on site or immediately adjacent to the site.	Option 1: APA → SI				X
	Option 2: PA/SI				
6. There is an apparent release and no documented on-site targets and no documented targets immediately adjacent to the site, but there are nearby targets. nearby targets are those targets that are located within 1 mile of the site and have a relatively high likelihood of exposure to a hazardous substance migration from the site					
7. There is no indication of a hazardous substance release, and there are uncontained sources containing CERCLA hazardous substance, but there is a potential to release with targets present on site or in proximity to the site.					

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Dawson Metal Products Camdenton Facility #2 DATE: July 21, 2017

TELEPHONE:
Incoming ()
Outgoing (X)

CONFERENCE:
Field ()
Office ()

SUBJECT: Former Dawson/Sundstrand/Modine Employee's Concerns

PERSONS INVOLVED:	REPRESENTING:
Amanda Branson	MoDNR, HWP, Superfund
Valerie Wilder	MoDNR, HWP, Superfund
Travis Lyon	MoDNR, HWP, Superfund
Keith Brown	MoDNR, HWP, Superfund
Jerry Rogers	Former Dawson/Sundstrand/Modine Employee

SUMMARY OF CONVERSATION:
The phone call started off with staff informing Mr. Rogers the department is beginning a few new investigations regarding Modine's operations at the Cox site after the fire in 1972 at the Sunset Dr. location. Staff explained that Mr. Roger's Facebook post was the reason for the call and it appeared that Mr. Rogers could give the department valuable information. Mr. Rogers stated "I sure hope so" and explained that he worked for the company when it was moved to the 1225 W. US Highway 54, (Cox Building) location where it operated for approximately one year. Operations at the Cox facility began about a week after the fire at the Sunset Dr. location. The fire occurred on a Friday night in 1972 and cleanup of the facility began the following Monday. Upper management did not provide PPE to employees during clean-up after the fire, only rubber gloves. Any equipment covered in oil collected a layer of black soot which had to be cleaned. Mr. Rogers also mentioned that some machines were covered with a blue dust he suspected was caused by the chemicals used during factory operations. The blue dusting occurred well before the fire took place. During the night of the fire, Mr. Rogers worked second shift, the first break he got was at 5. Mr. Rogers worked in room 2 and walked through room 1 on his break to go outside. Room 1 is where the degreaser is located and is where the fire began. A garage door separated the two rooms which was open at five because Mr. Rogers walked through room one to take his first break, by 11 the door had been closed causing Mr. Rogers to walk around the building to take his second break. The door had been closed due to a chemical reaction with the degreaser which probably caused the fire. The fire began shortly after and the building was evacuated. Workers hung-out outside for a short period before leaving when they were told to by emergency responders. Dawson, the owner, could not be reached after the fire.

Staff asked Mr. Rogers if he helped move equipment to the Cox location. Mr. Rogers replied that he did in fact help move equipment. He then explained the conditions at the Cox building. The

new location was not set up for the factory operations. There was no evaporator or ventilation system set up and no disposal area for wastes generated by the degreasing process (TCE was used for degreasing). For ventilation, workers would open back and side doors. The back door was used for shipping and the side door was used for receiving. Cleaning tools and products was done at the receiving door where there was no collection system in place for wastes. To clean/degrease, they used 55 gallon drums which were cut in half and filled with TCE. One 1/2 drum was used for the initial dunking to remove larger chunks of grease and debris then the next drum would be used to clean remaining grease off. Once the first drum was too dirty, it would be dumped directly into the environment and then filled with fresh TCE and used as the final rinse station making the previous final rinse station the initial station. The drums rotated this way for the year while located at the Cox facility. TCE was dumped right outside the back shipping door during the year at the Cox facility. One ½ 55 gallon drum would not last through a shift and sometimes multiple ½ drums were dumped each day. No one kept records. When they were located at the Sunset location there was a supervisor on each shift but he never saw any supervisor while located at the Cox facility.

Mr. Rogers stated he was involved in the dumping. At the time they didn't know better and there was no leadership. And the managers said the TCE was safe enough to drink (if it wasn't so hot). The building was run off oil and TCE. Coffee cans filled with TCE sat near every machine for cleaning tools or whatever needed to be cleaned. Workers would treat chiggers and poison ivy by rubbing TCE directly on their skin. Employee arms would turn white after working in the TCE all day. Many days employees would have open cuts and sores. Lesions would randomly appear on workers who worked with TCE.

Mr. Rogers explained that he posted on Facebook because a small group of workers worked at the facility when all this took place. Many have passed away and others are in bad health. Mr. Rogers wanted to get this out so more people would step forward and tell their story about what happened before there is no one left to tell.

Department staff asked if he would walk us through the facility and show us where everything took place if we get permission to access. Mr. Rogers explained that he would. He said that he believes the area of dumping is under concrete now from new additions to the building. He said his wife worked there for four years while it was the "fishing shack" and his daughter currently lives near the Hulett lagoon on Mulberry Street. Staff explained that the department plans to do more sampling around the lagoon as well.

Mr. Rogers then explained that the reason the workers never said anything at the time is because if the factory got shut down they would lose their jobs. It wasn't until later that he found out TCE was a carcinogen and caused other health issues as well; when an employee who was formerly in the Navy explained the health risk of TCE (in the navy they would use TCE to clean gun turrets and had to wear hazmat suits while cleaning in confined spaces). Mr. Rogers said the former Navy service member didn't stay long but what he said always bothered Mr. Rogers. Mr. Roger said he saw what he saw and other employees saw what they saw, he hoped we would get other viewpoints to fit the story together like a jigsaw puzzle.

Staff asked if he knew Jerry Palmer to which Mr. Rogers said he did. Mr. Palmer worked the

degreaser just on the other side of the garage door from where Mr. Rogers worked. Mr. Palmer was one of the employees who had to clean the degreaser. Cleaning the degreaser needed to be done regularly or metal chips would collect and start a chemical reaction and the building would have to be evacuated.
Staff asked when the TCE was dumped directly into the environment, would it sink directly into the ground. Mr. Rogers stated it depended on the weather conditions. Sometimes it would soak into the ground right away and sometimes it would run down the hill. He said if it was dry it would be more likely to run down the hill.

Staff asked if the soil where the TCE was dumped was stained. Mr. Rogers stated he didn't recall but at the time he and other workers didn't even think anything of it. It wasn't until the Navy guy explained to him that TCE was bad that he started being concerned, and that was later. They would play pranks on new employees which involved telling them to get a Styrofoam cup and bring some "Triclor" but before the new employee would get far the cup would already be melted. Managers repeatedly told employees that TCE posed no health risks and was safe enough to drink. Mr. Rogers explained that an awful lot of TCE was dumped at the Sunset location as well. Waste from an overflow tub from degreasing would be dumped after a shift. The tub was 2'X3'X1.5'. Staff asked which place dumped more and Mr. Rogers said the Sunset plant did over the course he worked there only because there was more opportunity (time) to pollute at that site.

Staff asked if there are any drums buried at the original site. Mr. Rogers stated that he couldn't recall but he didn't see everything that took place at the facility. Mr. Rogers stated the atmosphere at the facility improved sometime after these events; he wasn't really sure about the early days though.

After speaking with Mr. Rogers for a while it became clear that Mr. Rogers was concerned about his and his coworkers' health as a result of working with the TCE. Department staff explained to Mr. Rogers that if he had health concerns that we could get him in touch with Missouri Department of Health and Senior Services staff. Mr. Rogers stated he has had lesions show up on his body in the past, he gets chronic migraines, and currently many other health problems. He admitted that all his health problems probably aren't a result of working with TCE but he suspects some are. A doctor told him that the lesions Mr. Rogers got were worse than what he has seen in Vietnam veterans.

Staff asked Mr. Rogers if he had any suggestions of any other employees that were relocated to the Cox facility that would be able to provide more information. Mr. Rogers stated that if we could find out who the maintenance crew was at the time they'd be a good group to question since they conducted the riskiest tasks such as literally getting inside the degreaser to work on it (without PPE). Mr. Rogers stated that the crew has a high mortality rate. He gave the name, Mr. Dale Bland who worked on the maintenance crew; who has made complaints in the past. Mr. James McGuire who was a quality guy who conducted daily sampling of the holding area and daily blowdown tests for degreaser would also be a good contact. Charles Van Cleave, an on post supervisor in later years, was apparently there for an acid cloud event that required the evacuation of the facility.

Mr. Rogers said that the plant at the Sunset Drive facility went through at least 30,000 gallons of water each day and wasn't sure if the pre-treatment waste water plant was designed to handle that much flow. He believed there was some kind of deal between the city and the company. He just didn't understand how the city didn't notice all the chemicals going into their waste water treatment facility. Mr. Rogers stated that at the time water usage at the facility was more than the rest of the city users combined.

Staff asked Mr. Rogers if he ever met Mr. Dickerson, owner of the Cox facility. Mr. Rogers said he didn't believe a Mr. Dickerson owned the facility at the time. He said the company definitely moved there and described its location to confirm that we were talking about the same location (across from the juvenile justice center etc.).

Staff asked how many employees worked at the Lakers facility. Mr. Rogers said about 30 to 40 (four lines and three Freon booths which had a makeshift ventilation system of cutting a whole in the wall). Staff informed Mr. Rogers that new info regarding this site will be posted online and viewable by the public under Dawson Metal Product Facility #2.

Mr. Rogers said that the locals in Camdenton think the department allowed this pollution to take place so he figured the department would want to clean it up to clear the department's name. Finally, staff asked Mr. Rogers if chromium was ever used at the facility. Mr. Rogers stated that they did all of their own tooling, until corporate took over tooling, so chromium was used at the original facility (but not at the Cox building). He stated nitric acid was used as well.

ACTION TAKEN:

Keith Brown 7/21/17

Environmental Specialist

Amanda Branson 7/24/17

Date of Signature

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Dawson Metal Products Camdenton Facility #2

DATE: August 3, 2017

TELEPHONE:
Incoming ()
Outgoing (X)

CONFERENCE:
Field ()
Office ()

SUBJECT: Former Dawson/Sundstrand/Modine Employee's Concerns

PERSONS INVOLVED:	REPRESENTING:
Amanda Branson	MoDNR, HWP, Superfund
James McGuire	Former Dawson/Sundstrand/Modine Employee

SUMMARY OF CONVERSATION:
Valerie left Mr. McGuire a voicemail explaining that we were calling him after being referred to as a former employee at the Dawson/Sundstrand Facility. She requested that he return our call as convenient to him. Mr. McGuire returned the call after hours and stated that he did in fact work for Dawson, Sundstrand, and Modine. He requested that Amanda return his call.

A follow up call was placed on 08/07/2017 by Amanda Branson and Keith Brown, MoDNR. Mr. Palmer was unavailable at the time so a voicemail was left and Amanda left her contact information and asked that James leaves a voicemail letting staff know a better time to contact him if he happens to call after hours. James returned the call to Amanda later in the afternoon; her and Keith sat down and talked with James.

James confirmed with staff that he did in fact work for Dawson, Modine, and Sundstrand. He remembers the night of the fire and does remember relocating to the Cox facility. He worked at the Cox facility as a Freon inspector until they were able to relocate back to the Sunset Drive facility somewhere between 6-12 months. When asked if he could describe the process at the Cox facility James said that a 55 gallon barrel would be cut in half, both halves being filled with TCE. They would use 1 drum as a 1st rinse station and the 2nd drum as the 2nd rinse station. They would use these drums in a rotation. Once the 1st rinse station because too dirty to use they would wheel it outside and dump the barrel. In the meantime they would move the 2nd rinse station drum to become the 1st rinse station. After dumping the original dump station they would bring that drum in and refill it with TCE and it became the 2nd rinse station. This occurred the entire time they were located at the Cox facility. James does not remember there being containers of TCE at the work stations because he did not use it being the Freon inspector. He said they knew what they were using because they had read the labels and even after refusing to use it they were forced to use it. He recalls a time where they brought in a temporary pit degreaser with no ventilation & he refused to do it, but was forced to do it anyway. He said he could attend a site visit if needed.

When asked if he knew any information about sludge from Hulett Lagoon being disposed in other locations other than the airport, James said he honestly didn't know any information about Hulett Lagoon other than that it was cleaned out. He asked if MoDNR knew about the 30,000 gallon reservoir spill at the Sunset Drive location, Amanda responded that she had not heard about that but our RCRA section would contact him for more information pertaining to this event.

Amanda Brawson — Environmental Specialist

8/3/17 — Date of Signature

DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality

TELEPHONE OR CONFERENCE RECORD

FILE: Dawson Metal Products Camdenton Facility #2

DATE: November 9, 2017

TELEPHONE:
Incoming (X)
Outgoing ()

CONFERENCE:
Field ()
Office (X)

SUBJECT: Former Dawson Employee

PERSONS INVOLVED:
Valerie Wilder
Frankie Rogers

REPRESENTING:
MoDNR, HWP, Superfund
Former Dawson Employee

SUMMARY OF CONVERSATION:
Mr. Frankie Rogers contacted me at the request of Jerry Rogers, another former employee of Dawson/Sundstrand/Modine. Frankie was a Freon tester at the Dawson Metal Products Camdenton Facility #2 (formerly referred to as the Cox building). Frankie said Jerry wanted him to call us to detail activity that occurred at the Dawson #2 facility when operations had been moved there after the fire in July of 1972 at the 221 Sunset Drive facility. Frankie started working at the Cox building right after the fire and worked there over the winter and the following spring and summer of 1973, perhaps even into the fall, but he wasn't certain how long they worked at the Cox building before moving operations back to the Sunset Drive facility. Frankie worked the 1st shift 5-6 days a week and several Saturdays.

Frankie worked the Freon line but also helped with the degreasing operations. He described the process of pouring the TCE product into a ½ 55 gallon drum that staff put parts in by hand, let them soak, took them out with a basket and used an air hose to dry the parts off, which spilled some of the excess TCE out onto the floor. He said they definitely ended up with TCE on their skin when transferring parts, and their hands would swell up after working sometimes. He did not remember any floor drains in the portion of the building where the TCE degreasing occurred. He only remembered a floor drain in the bathroom.

Frankie went on to describe that he was one that helped dispose of the used TCE in the ½ drums himself. He would use a forklift to move the drum onto the loading dock (northwest side of the building) edge and tip the drum to empty the contents. He said the TCE would splatter everywhere when poured and the loading dock area would get pretty dirty. As a result, occasionally, he would use the forklift to take the drum of used TCE out the side door (which would have been on the northeast side of the building) and dispose of it out past the edge of the parking lot onto the ground because the loading dock was just too dirty. He estimated about 1.5 drums of used TCE was disposed of per shift.

He also worked at the Sunset Drive facility and the degreasing operations were different there because there were degreaser machines that recycled the TCE in the system so used TCE was only drained and disposed of about every 3 weeks. The used TCE would be drained into drums that were sometimes taken outside to be disposed of. He mentioned that Robert Chandler may know more about this. Mr. Chandler washed the degreasers with soda ash by crawling into the degreasers. Frankie recalled that Mr. Chandler had two kidney transplants because he lost both of his kidneys. Frankie also talked about nitric acid being used at the Sunset Drive facility but not at the Cox building. He said it went down the drains into the lagoon.

Frankie now lives in Montreal, Missouri. He is 65 years old and lives at 621 Brown Lane Stoutland, MO 65567-9242, phone number 417-286-3577. He has been retired since 1995 and has had open heart surgery, has bad eyes, and has kidney problems. His wife worked at the Sunset Drive facility until 2000 ran machines, degreasers and took samples.

ACTION TAKEN:
This information will be incorporated into the Site Inspection report for the Dawson Metal Products Camdenton Facility #2 site. This is the first report of waste TCE being disposed of in a location other than the loading dock. Frankie was not exactly clear on where at the edge of the parking lot the drums of TCE were disposed of when taken out the side door, but offered to assist in an investigation by looking at a map or visiting the site if he is able.

Valerie Wilda — Superfund Section Chief

11/9/17 — Date of Signature

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Dawson Metal Products
Vapor Intrusion Field Form

Part 1: Physical Building Inspection

Preparer's name: DARREN MOULDER Date/Time prepared: 1/11/18

1. Occupant information

Occupant name(s): LAKER FISHING TACKLE Interviewed: ☐ Yes ☐ No

Mailing address: 1225 WEST HWY 54

City: CAMDENTON State: MO Zip code: 65020

Phone: 573-346-4305 Fax: 573-346-6056 E-mail: DARREN.MOULDER@LAKER.COM

Number of occupants at this location: 20-30 Age range of occupants: 25-70

2. Owner/Landlord information (Check if same as occupant: ☐)

Occupant name(s): JACK DICKERSON Interviewed: ☐ Yes ☐ No

Mailing address: 12 WILLOW CREEK ROAD

City: CAMDENTON State: MO Zip code: 65020

Home phone: 573-280-5347 Office phone: 573-346-2279

3. Building type (Check appropriate response)

☐ Residential ☒ Industrial ☐ School ☐ Church ☐ Commercial/Multi-use

☐ Other (specify):

If the property is residential, what type? (Check appropriate response)

☐ Ranch rambler ☐ Raised rambler ☐ Townhouses/Condos ☐ Duplex ☐ Modular ☐ 2-Family

☐ Split level ☐ Contemporary ☐ Apartment house ☐ Cape cod ☐ Log home ☐ 3-Family

☐ Colonial ☐ Mobile home ☐ Other (specify): _____

4. Building description

If the property is commercial or industrial, describe the business use(s):

SHIPPING AND MANUFACTURING

Indicate the number of floors and general use of each floor of the building beginning with lowest level:

1– SHIPPING AND MANUFACTURING

2 – FILE STORAGE (SMALL AREA ABOVE OFFICES)

If there are multiple residential units, indicate how many units: _____ When was building constructed: _____

☐ Yes
☒ No

Type of insulation used in building: STANDARD AND SPRAY APPLICATIONS Elevators or lifts:

Basement/Lowest level depth below grade: _____ (feet)

Observed basement characteristics (Check all that apply)

Is basement/lowest level occupied:	☒ Full time	☐ Occasionally	☐ Almost never	
Basement type:	☒ Full	☐ Crawlspace	☐ Slab	☐ Other:
Floor materials:	☒ Concrete	☐ Dirt	☐ Stone	☐ Other:
Floor covering:	☒ Uncovered	☐ Covered	☐ Covered with:	
Concrete floor:	☒ Unsealed	☐ Sealed	☐ Sealed with:	
Foundation walls:	☐ Poured	☐ Block	☐ Stone	☒ Other: NONE
Basement finished:	☒ Unfinished	☐ Finished	☐ Partially finished	
Basement wetness:	☐ Wet	☐ Damp	☒ Seldom	☐ Moldy
Sump pump present:	☐ Yes ☒ No	If yes, was water present: ☐ Yes ☐ No		

Indicate sources of water supply sources (i.e., drinking, irrigation, etc.) and type of sewage disposal
(Check all that apply)

Water supply:	☒ Public water	☐ Drilled well	☐ Driven well	☐ Dug well

Water Treatment:	☐ Softener	☐ Charcoal filter	☐ Reverse osmosis	☐ Distilling	☐ Other, Specify_____

Sewage disposal:	☒ Public sewer	☐ Septic tank	☐ Leach field	☐ Dry well:

5. Heating, venting, air conditioning, or other building controls (Check all that apply)

Type of heating system(s) used in this building (Check all that apply)

☒ Hot air circulation ☒ Space heaters ☐ Electric baseboard ☐ In-floor heating ☒ Heat pump

☐ Steam radiation boiler ☐ Wood stove ☐ Hot water baseboard ☐ Radiant floor ☐ Outdoor wood

☒ Other (specify): Propane **Primary type:**

Were any alternate types of heating systems used while the samples were collected?

☒ No ☐ Yes, Specify type_____

Primary type of fuel used (Check appropriate response)

☐ Natural gas ☐ Fuel oil ☐ Kerosene ☒ Electric ☒ Propane

☐ Solar ☐ Wood ☐ Coal

If hot water tank present, indicate fuel source: Electric

Boiler/furnace is located in:	☒ Basement	☐ Outdoors	☐ Main floor	☐ Other:	

Type of air conditioning:	☒ Central air	☐ Window units	☒ Open windows	☐ No mechanical system

Are there air distribution ducts present: ☒ Yes ☐ No

Describe the supply and cold air return ductwork and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

IN OFFICE AREA ONLY, NOT IN THE WAREHOUSE

6. Grid plans

Use grid plans to describe floor plans, locate potential soil vapor entry points (e.g., cracks, utility ports, drains); and if applicable, identify sample locations (sub-slab, indoor air, outdoor air sampling).

Floor plan for basement or lowest level:

Floor above lowest level:

Outdoor grid plot (Include if outdoor ambient air samples collected):

Insert sketch (or attach separate document) of the area outside the building and locate outdoor air sample locations.
If applicable, provide information on spill locations, potential air contamination sources, locations of wells, septic system, etc., and PID meter readings. Indicate wind direction and speed during sampling.



Part 2: Indoor Air Quality Survey

Complete if indoor air sampling is conducted (use grids in Part 1 for labeling sampling locations).

Factors that may influence indoor air quality:

Is there an attached garage:	☐ Yes ☒ No	Where:	
Is there smoking in the building:	☐ Yes ☒ No	How frequently:	
Have professional cleaning products been used recently:	☒ Yes ☐ No	When & type:	
Have cosmetic products been used recently:	☐ Yes ☒ No	When & type:	
Has painting/staining been done in the last 6 months:	☒ Yes ☐ No	Where & when:	Painting staples in products.
Has any remodeling or construction occurred in the last 6 months:	☐ Yes ☒ No	Where & when:	
Is there new carpet, drapes, or other textiles:	☒ Yes ☐ No	Where & when:	
Have air fresheners been used recently:	☒ Yes ☐ No	When & type:	
Are any gasoline powered devices or gasoline storage cans stored in any room, basement, or attached garage in this house or apartment?	☒ Yes ☐ No	Where & type:	
Do you have any house pets kept indoors?	☐ Yes ☒ No	Type:	
Have any pesticides/herbicides been used inside or outside of your home in the last week?	☐ Yes ☒ No	Type:	

Is there a clothes dryer:	☐ Yes ☒ No	If yes, is it vented outside:	
Are there odors in the building:	☐ Yes ☒ No	If yes, please describe:	

Do any of the building occupants use solvents at work: ☐ Yes ☒ No

If yes, what types of solvents are used:

Do any of the building occupants regularly use or work at a dry-cleaning service: ☐ Yes ☒ No

If yes, indicate approximately how frequent: _____

Product inventory form (Add additional rows if needed)

List products identified in the building that have the potential to contribute contaminants of concern to indoor air:

Location	Product description*	Comments	Instrument readings if taken and units
OFFICE	BASIC HOUSEHOLD CLEANERS	Pledge, 409, bleach, dish soap, Clorox	
WAREHOUSE	BASIC HOUSEHOLD CLEANERS	Pledge, 409, bleach, dish soap, Clorox	

* Describe the condition of the product containers as Unopened (UO), Used (U), or Deteriorated (D).
Include photographs of product containers as appropriate to document products and ingredients.

FILE: Camdenton Sludge Disposal Area PA/SI Site
CamdenCounty

Dawson Metal Products Camdenton Facility #2
Camdenton, Mo
Site Investigation
MGS, 1999

MEMORANDUM

DATE: March 30, 1999

TO: Valerie Wilder, Environmental Specialist
Superfund Section, HWP, DEQ

FROM: Neil Elfrink, Geologist
Environmental Geology Section, GSP, DGLS

SUBJECT: Hydrogeologic Report for the Camdenton Sludge Disposal Area Site

LOCATION: NW 1/4, SE 1/4, SE 1/4, Section 4, T. 37 N., R. 16 W., Camden County, Missouri; 37^{o} 58' 10" North Latitude and 92^{o} 41' 20" West Longitude

The hydrogeologic report for the Camdenton Sludge Disposal Area site is enclosed. Please contact me at (573) 368-2162 if you have any questions regarding this report, or if additional information is required.

NE/lh

Attachments

HYDROGEOLOGIC REPORT FOR THE CAMDENTON SLUDGE DISPOSAL AREA CAMDENTON, CAMDEN COUNTY, MISSOURI

GENERAL CONSIDERATIONS

Site Location

The Camdenton Sludge Disposal Area is located on the Decaturville 7.5-minute quadrangle map (Figure 1), in the Northwest Quarter (NW 1/4) of the Southeast Quarter (SE 1/4) of the Southeast Quarter (SE 1/4) of Section 4, Township 37 North, Range 16 West. Coordinates for the center of the disposal area are approximately 37^{o} 58' 10" north latitude and 92^{o} 41' 20" west longitude. Elevation at the site is approximately 1,060 feet MSL. The Camdenton Sludge Disposal Area is located at the Camdenton Memorial Airport, south of the runway and north of County Road 5-120. The site is approximately 4.6 miles southeast the Former Hulett Lagoon Site. Contaminated soils from the Former Hulett Lagoon in Camdenton were transported to and disposed of at the Camdenton Sludge Disposal Area in 1988.

Physiographic Province

The site is situated on an upland in the Salem Plateau region of the Ozark Plateau physiographic province (Missouri Water Atlas, 1986). The topography of the Salem Plateau is characterized by a rolling upland surface with rugged hills dissected by entrenched, narrow stream valleys (Gann, 1976). Karst features, such as springs, sinkholes, and losing streams, are characteristic of the Salem Plateau.

GROUNDWATER PATHWAY

Stratigraphic Units

A stratigraphic column (Table 1) has been tabulated based upon the stratigraphy of nearby wells (Well Log File, 1999). The Camdenton Sludge Disposal Area has been included on a geologic map produced by Mark Middendorf (1984).

The youngest bedrock formation beneath the site is the Ordovician-age Roubidoux Formation, assigned to the Canadian Series. The Roubidoux Formation consists of dolomite, sandy dolomite, and sandstone (Thompson, 1991). In the Camdenton area, soluble portions of the Roubidoux have generally been removed by dissolution. Nearby well logs indicate that the Roubidoux Formation may consist of clayey residuum and sandstone, with only small lenses of carbonate rock remaining. In the headwaters of Racetrack Hollow, approximately ½ mile west of the site, erosion has completely removed the Roubidoux Formation and the underlying Gasconade Dolomite is exposed at the surface. Approximately 1½ miles northeast of the site, Jefferson City Dolomite exposures overlie the Roubidoux Formation (Middendorf, 1984).

Underlying the Roubidoux Formation, the Gasconade Dolomite consists of cherty

dolomite and is estimated to be approximately 280 feet thick in the vicinity of the site (Well Logs, 1999). A basal unit of the Gasconade Dolomite, known as the Gunter Sandstone Member, commonly separates the Ordovician- and Cambrian-age strata. The Gunter Sandstone is approximately 25 feet thick in the Camdenton Airport area.

Cambrian rocks in the Camdenton area were deposited in a complex depositional environment. The Camdenton Sludge Disposal Area is located near the western margin of a Cambrian-age intrashelf sedimentary basin known as the Central Missouri Basin (Palmer and Hayes, 1997). During Cambrian time, the Camdenton area was part of an emerging tectonic feature known as the Lebanon Arch. The north-south trending Lebanon Arch consists of carbonate platform rocks, that in some areas, thin over Precambrian highlands (Gregg et. al., 1989). The boundary between the Central Missouri Basin and the Lebanon Arch is transitional and poorly defined (Map E, Palmer and Hayes, 1997). Dramatically different lithologies and abrupt facies changes are depicted in area well logs (Figure 2). In general, more shaly, basinal rocks to the east pinch-out against the Lebanon Arch.

Because of the tectonic setting, Cambrian beds in the Camdenton area are difficult to categorize, and “layer-cake” stratigraphy should not be assumed. The following descriptions are simplified. The upper-most Cambrian unit in the area is the Eminence Dolomite, which consists of approximately 240 – 635 feet of dolomite with minor amounts of chert. The Eminence Dolomite is underlain by about 25 - 230 feet of Potosi Dolomite, which consists of dolomite, chert, and drusy quartz. Beneath the Potosi Dolomite, in descending order, are the Derby-Doerun Dolomite, the shaly Davis Formation, the Bonneterre Formation, and the Lamotte Sandstone. The entire Cambrian section is estimated to be over 1,150 feet thick.

Cross-sections constructed using information from specific well logs (Well Log Files, 1999) are presented in Figures 2 and 3. The cross-section locations are shown on Figures 1.

Aquifers

The Ozark Aquifer, which includes all bedrock units above the Cambrian-age Derby-Doerun Dolomite, is the shallowest aquifer beneath site. The Ozark Aquifer is considered exposed at the surface at the Camdenton Sludge Disposal Area. The total thickness of the aquifer is approximately 950 feet. Each of the units which comprise the Ozark Aquifer have individual characteristics that control their water-bearing capabilities; however, in general, the Ozark Aquifer produces good-quality water, with production rates generally proportional to well depth.

According to Harvey et. al. (1983, p. 38), there can be perhaps as many as three separate potentiometric surfaces within in the Ozark Aquifer in upland areas such as the Camdenton Sludge Disposal Area. Water levels in upland wells completed in the Roubidoux Formation range from 18 to 205 feet below the surface. Howver it is possible that the Roubidoux Formation present beneath this particular site is too thin to

contain groundwater. According to Harvey et. al. (1983), water levels in upland wells completed in the Gasconade Dolomite range from 14 to 300 feet below the surface, with an average depth to water of 150 feet. Water levels in upland wells completed in the Eminence Dolomite and deeper formations range from 15 to 407 feet below the surface, with an average depth to water of 200 feet. The multiple water-level phenomenon common in upland areas suggests significant local recharge to the deeper portions of the Ozark Aquifer.

Differences in head between shallow and deep portions of the Ozark Aquifer are typical in upland areas such as the Camdenton Sludge Disposal Area. The site is expected to be a groundwater recharge zone. Extensive pumping of deeper groundwater can increase the downward vertical gradient. The Camdenton Airport Well is reportedly used only once per week with the bulk of water being supplied by Well #2 located approximately 3 miles south of the Camdenton Sludge Disposal Area. Nearby domestic wells can also contribute to an increase in downward gradient. Pumping rates at the Camdenton Airport Well may be high enough to engulf the site within a cone of depression. The radius of influence of nearby production wells should be determined.

Because detailed hydrogeologic studies have not been conducted at the site, groundwater flow directions within the bedrock can only be approximated. According to the potentiometric map of the Roubidoux-Gasconade sequence in “Hydrology of Carbonate Terrane – Niangua, Osage Fork, and Grandglaize Basins, Missouri” (Harvey, et. al., 1983, Figure 13), shallow groundwater beneath the site could flow eastward toward Dry Auglaize Creek. However, according to Figure 15 “Generalized direction of groundwater flow in the Niangua, Osage Fork, and Grandglaize basins” published in the Water Resources Guide No. 35 (Harvey, et. al., 1983), groundwater beneath the site could flow northwestward toward the Niangua Arm of the Lake of the Ozarks. Furthermore, dye traces have shown that surface water lost in Dry Auglaize Creek can cross the surface water divide and discharge into the Niangua River, northwest of the site. It is possible that both groundwater flow directions are correct. Shallow groundwater may flow toward Dry Auglaize Creek, while deeper groundwater may be diverted into the Niangua Basin.

Monitoring well nests are needed to accurately determine the magnitude of the downward vertical gradient. The upper Gasconade Dolomite *may* inhibit the downward migration of contamination. However, fracturing and karst development may have resulted in a local increase in permeability within the otherwise relatively tight upper Gasconade Dolomite.

The Gunter Sandstone is generally highly porous and permeable and is an important source of domestic groundwater supplies in the area. Because the Gunter Sandstone generally yields adequate domestic water supplies, few private wells in the area penetrate the underlying Cambrian Formations. However, municipal wells in the Lake of the Ozarks area are generally cased through the Gunter Sandstone, in order to avoid possible bacterial contamination.

The Eminence and Potosi Dolomites are a major source of municipal drinking water throughout the Ozark area, including the City of Camdenton. The Eminence Dolomite is differentiated from the underlying Potosi Dolomite by the lack of druse. A druse is a rock cavity encrusted with finely crystalline quartz. The druse-rich Potosi Dolomite is the most permeable geologic unit within the Ozark Aquifer and generally has an extensive network of karstic channels.

The shallowest reliable aquitard beneath the site is the St. Francois Confining Unit, approximately 1,150 feet below the surface. The St. Francois Confining Unit separates the Ozark Aquifer from the deeper St. Francois Aquifer. The St. Francois Aquifer includes the Cambrian-age Bonneterre Formation and Lamotte Sandstone. The St. Francois Aquifer is not used as a water source in Camden County. Water losses in the Lamotte Sandstone are common in some parts of the Ozark Region, although the phenomenon is poorly understood. Outside the St. Francois Mountain area, few water wells penetrate the Lamotte Sandstone, since yields may actually be reduced. Groundwater flow directions in the deeper St. Francois Aquifer are generally unknown and may be complicated.

Baseline water-level and pumping rate data need to be collected before informed decisions about groundwater movement in the Camdenton subsurface can be made. Static water levels should be measured at least monthly at any inactive wells. Detailed records of active wells should include volume of water pumped, length of pumping cycles, and drawdown measurements.

Aquifer Discontinuities

There are no aquifer discontinuities within a 4-mile radius of the site. Folds and faults in the area cannot be considered aquifer discontinuities for HRS scoring because their effects on groundwater movement are so poorly understood. Older faults have more highly-developed solution channels and may, therefore, act as groundwater conduits (Harvey et. al., 1983). Younger faults can actually act as aquitards, inhibiting groundwater flow

Wellhead Protection Area

The Former Hulett Lagoon site is located in a Wellhead Protection Area according to section 1428 of the Safe Drinking Water Act. In Missouri, Wellhead Protection Areas are designated by the Missouri Wellhead Protection Program. The Former Hulett Lagoon Area site is located within a 1-mile radius of a wellhead in a carbonate aquifer system (Public Drinking Water Program, 1994, page 15). The wellhead of concern is the Camdenton Airport Well.

Revisions to the 1994 Missouri Wellhead Protection Program document are currently under review by EPA. However, the Former Hulett Lagoon site should remain in a designated Wellhead Protection Area under any new management program that may be approved.

The Camdenton Sludge Disposal Area is located in Area 1, as designated by the DGLS Wellhead Protection Section. Since September 1987, Area 1 bedrock wells have been required to have 80 feet of casing and penetrate at least 30 feet of bedrock (Missouri Well Construction Rules, 1996).

Karst Features

The Camdenton Sludge Disposal Area is considered karst (Missouri Water Atlas, 1986). Significant karst features are present within a 4-mile radius of the site. Dissolution has caused the carbonate aquifers to be extremely heterogeneous (Harvey, et. al., 1983).

Geologic Structures

Geologic structures can influence groundwater movement (Harvey, et. al., 1983). The effects of the structural deformation on groundwater are poorly understood, but the faulting and folding has probably increased hydraulic conductivities in some areas. The northwest-trending structures in the Camdenton area tend to be older than northeast-trending structures. Northwest-trending structures may act as groundwater conduits.

Faults and folds have been mapped within the 4-mile groundwater target radius (Middendorf, 1984). Well log data suggest unmapped faults may also affect the area. A circular area of complex brecciation, known as the Decaturville Structure, lies just southwest of the 4-mile target radius (Wedge, in preparation). The Decaturville Structure is part of the Decaturville-Crooked Creek axis, a series of highly-faulted areas stretching eastward into Kentucky. The Mine Hollow Fault is shown on Figure 1 and located approximately 2/3 mile southeast of the Camdenton Sludge Disposal Area. The fault appears to radiate from the Decaturville Structure. The Mine Hollow Fault has a northeast trend and is downthrown approximately 60 feet to the northwest.

The axis of a northwest-trending syncline, called the Racetrack Hollow Syncline (Figure 1), has been mapped less than 2 miles west of the Camdenton Sludge Disposal Area (Middendorf, 1984). The Red Arrow Fault is located less than 3 miles southwest of the site (Wedge, in preparation). The Red Arrow Fault strikes northwest and, in general, the southwest side is downthrown approximately 100 feet. However, geology along the fault zone is complicated. LOGMAIN Well # 28602 (Figure 2) is located along the western portion of the fault zone and indicates significant upward movement. Ha Ha Tonka Spring is located along the trace of the Red Arrow Fault.

The poorly defined Proctor anticline runs across Camden County (McCracken, 1971). The Proctor Anticline changes to a fault in southern Camden County (Wedge, in prep.). The Proctor Fault (Figure 1) has been mapped less than 4 miles northeast of the Camdenton Sludge Disposal Area (Middendorf, 1984). The structure is probably related to a rejuvenated Precambrian fault.

Travel Time Factor

Rock layers that underlie the site are karst. The resulting Travel Time Factor Value is 35 (Federal Register, 1990).

GROUNDWATER TARGETS

Target Distance Limit

Groundwater use within the 4-mile groundwater target distance limit is extensive. Most residences near the Camdenton Sludge Disposal Area utilize private wells.

Wells

Over 92 drinking-water well locations within the groundwater target distance limit are recorded in the databases available at the Division of Geology and Land Survey. The LOGMAIN database contains information on older wells. The DGLS Well Wellhead Protection Section's Water Well Information System (W.I.M.S) database contains information on wells drilled since 1987. Additional information is available from the Public Drinking Water Program.Well, Missouri Department of Natural Resources, Division of Environmental Quality. Site locations are presented on Figure 4, and the corresponding well data is tabulated in Table 2. Some locations may be estimated or based on section centroids. The vast majority of the wells on record are domestic supply wells. Some wells may no longer be active. Many active wells may not be recorded in DGLS databases.

According to DEQ personnel and databases available at DGLS, one private well is located with ¼ mile of the Camdenton Sludge Disposal Area. 3 private wells are located with ¼ and ½ mile of the Former Hulett Lagoon Site. 2 wells are located between 0.5 and 1 mile of the site, including 1 community well and 1 private well. An additional 18 wells are located between 1 and 2 miles from the site, including 1 transient noncommunity well and 17 private wells. 30 wells are located between 2 and 3 miles from the site, 2 nontransient noncommunity wells and 28 private wells. 38 wells are located between 3 and 4 miles of the site including 2 community wells, 1 nontransient noncommunity well and 35 private wells.

Nearest Wells

It is likely that a large number of private wells in the area are not included in any DGLS database. The nearby wells mentioned here were located by DEQ personnel. The nearest well is located a few hundred feet west of the Camdenton Sludge Disposal Area at 3499 RR3 (County Road 5-120). Construction details for the well are not available.

Two private wells are located approximately ¼ mile southeast of the Camdenton Sludge Disposal Area. According to the owner, the well on the north side of County Road 5-

120, at 3496 RR3 was drilled in 1971 to a total depth of 528 feet with 40 - 45 feet of casing and the remainder open hole. Directly across the road from the 3496 RR3 residence is a third private well reported to have been drilled sometime between 1956 and 1958 to a total depth of 280 feet.
The nearest public drinking water supply well on record is Camden County Public Water Supply District #2 Well #1, known as the Camdenton Airport Well. The well is 848 feet deep and has 330 feet of casing. The well is illustrated on the Figure 2 cross-section. The Camdenton Airport Well is reportedly pumped only once per week. The Camden Co. PWSD #2 apparently obtains most of its water from Well #2, located approximately 3 miles south of the Camdenton Sludge Disposal Area.

SURFACE WATER PATHWAY

Hydrologic Setting

The Camdenton Sludge Disposal Area is situated near the crest of broad ridgetop that acts as the drainage divide between streams draining northwest, toward the Niangua Arm of the Lake of the Ozarks and streams draining east, toward the Dry Auglaize Creek. South and east of the site, unnamed streams flow southeast toward Forbes Branch. The natural landforms and drainage patterns at the site have been obscured by airport construction and soil disposal. The site itself has been leveled, while the surrounding terrain exhibits low natural relief (2% to 4% slopes). Land use patterns for the surrounding upland near the Camdenton Sludge Disposal Area include residential and agricultural properties with some light-industrial use. The steeper slopes are generally forested.

Rainfall Data

The average annual precipitation in the area of the Camdenton Sludge Disposal Area is slightly more than 37 inches. Average annual run-off is around 10 inches, and evapotranspiration amounts to about 28 inches per year; therefore, little precipitation is available for infiltration (Vandike, 1995). The 2-year, 24-hour rainfall for the area is about 3.5 inches (Rainfall Frequency Atlas, undated).

Surface Water Migration Path

Run-off from the Camdenton Sludge Disposal Area Site flows eastward toward Forbes Branch and Dry Auglaize Creek, both losing streams. Surface runoff would have to travel over 2.2 miles before reaching perennially-flowing water. Therefore, the potential to release by overland flow is not addressed in this document. Groundwater contamination is the main concern at the Camdenton Sludge Disposal Area Site.

Virtually all streams that have been evaluated near the Camdenton Sludge Disposal Area are losing. Losing streams include Forbes Branch, North Fork Linn Creek, and Racetrack Hollow. All are located less than 1 mile from the site. (Losing Stream File, 1999).

SURFACE WATER TARGETS

Drinking Water Intakes

No known direct intake of stream water is located within 15 downstream miles of the Camdenton Sludge Disposal Site (Missouri Public Water Systems, 1997).

SOIL / AIR PATHWAY

The Camdenton Sludge Disposal Site is now vegetated, and downstream or downwind receptors are not likely to be affected by the site itself.

The native soil in the vicinity of the Camdenton Sludge Disposal Area is the Lebanon silt loam (Wolf, 1994). Lebanon soils are deep, moderately well-drained soils typical of ridgetops. Permeability is moderate, although a shallow fragipan, if present, may perch water. Even if a fragipan is present, downward seepage is a potential concern.

The HRS Soil Group Designation from is C (Federal Register, 1990, Table 4-4).

REFERENCES

Anderson, K. H., et. al., Geologic Map of Missouri. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1979, 1 sheet.

Brown, James C., unpublished geologic map of the Hahatonka 7.5-Minute Quadrangle, SP-8426. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1984, 1 sheet.

Camdenton 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1983, 1 sheet.

Decaturville 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1975, 1 sheet.

DuCharme, C. B. and T. M. Miller, Missouri State Water Plan Series, Volume IV: Water Use of Missouri. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1996, 150 pages.

Federal Register, Volume 55, No. 241, Friday, December 14, 1990.

Gann, E. E., Water Resources of South-Central Missouri, Hydrologic Investigations Atlas HA-550. Department of the Interior, United States Geological Survey, 1976, 4 sheets.

Green Bay Terrace 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1983, 1 sheet.

Green Bay Terrace 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1959, photorevised 1982, 1 sheet.

Gregg, J. M., J. R. Palmer, and V. E. Kurtz, Field Guide to the Upper Cambrian of Southeastern Missouri: Stratigraphy, Sedimentology, and Economic Geology. Department of Geology and Geophysics, University of Missouri, Rolla MO 65401, 1989.

Guidance for Performing Preliminary Assessments Under CERCLA, EPA/540/G-91/013, Publication 9345.0-01A, September 1991.

Hahatonka 7.5-Minute Topographic Quadrangle. Department of the Interior, United States Geological Survey, 1982, 1 sheet.

Harvey, E. J., John Skelton, and D. E. Miller, Hydrology of Carbonate Terrane – Niangua, Osage Fork, and Grandglaize Basins, Missouri, Water Resources Report 35, Missouri Department of Natural Resources, Division of Geology and Land Survey, 1983.

Imes, J. L., Major Geohydrologic Units in and Adjacent to the Ozark Plateaus Province, Missouri, Arkansas, Kansas, and Oklahoma, U.S. Geological Survey Hydrologic Investigations Atlas HA-711-A, scale 1:750,000, 1991, 1 sheet.

Imes, J. L., Major Geohydrologic Units in and Adjacent to the Ozark Plateaus Province, Missouri, Arkansas, Kansas, and Oklahoma - Ozark Aquifer, U.S. Geological Survey Hydrologic Investigations Atlas HA-711-E, scale 1:750,000, 1990, 3 sheets.

Inventory of Missouri Public Water Systems, 1997. Missouri Department of Natural Resources, 210 pages, 1997.

Losing Stream File. Missouri Department of Natural Resources, Division of Geology and Land Survey, February, 1999.

McCracken, Mary H., Structural Features of Missouri, Report of Investigation Number 49. Missouri Geological Survey and Water Resources, 1971.

Middendorf, Mark A., unpublished geologic map of the Decaturville 7.5-Minute Quadrangle (except for Decaturville disturbed area), SP-8405. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1984, 1 sheet.

Missouri Water Atlas. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1986.

Missouri Water Resources Law - Annual Report, Water Resources Report Number 52. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1996, 30 pages.

Missouri Well Construction Rules, Private Water Wells, Heat Pump Systems, Pump Installations and Monitoring Wells, Authorizing Statutes – 256.600 to 256.640 RSMo, Missouri Department of Natural Resources, Division of Geology and Land Survey, 1996.

Missouri Wellhead Protection Program, Missouri Department of Natural Resources, Division of Environmental Quality, Public Drinking Water Program, December, 1994.

Palmer, J. R and T.S. Hayes, Maps Showing Locations of Known Mississippi Valley-Type Deposits and Occurrences in the Ozark Mountains Region Relative to Late Cambrian Shaly Lithofacies and Other Shales, Missouri, Arkansas, Kansas, and Oklahoma. U.S. Geological Survey Miscellaneous Field Studies Map MF-1994-F, 1997.

Rainfall Frequency Atlas of the United States, Technical Paper Number 40. United States Department of Commerce, undated.

Soil Survey of Camden County, Missouri, United States Department of Agriculture Soil Conservation Service in cooperation with Missouri Agricultural Experiment Station, April 1989.

Thompson, Thomas L., Paleozoic Succession in Missouri- Part 2, Ordovician System, Report of Investigations Number 70. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1991.

Vandike, J. E., Missouri State Water Plan Series, Volume 1: Surface Water Resources of Missouri, Water Resources Report Number 45. Missouri Department of Natural Resources, Division of Geology and Land Survey, 1995, 122 pages.

Water Resources Data, Missouri Water Year 1989, U.S. Geological Survey Water-Data Report MO-89-1. Department of the Interior, United States Geologic Survey, 1990, 354 pages.

Wedge, Keith, Structural Features of Missouri. Missouri Department of Natural Resources, Division of Geology and Land Survey, in preparation.

Well logs for the Camdenton area on file at DGLS, March, 1999.

Wolf, David W., Soil Survey of Camden County, Missouri. U.S. Department of Agriculture, Soil Conservation Service, 1994, 127 pages.

Remedial Investigation

Summary Report

Volume 1

Former Hulett Lagoon

Camdenton, Missouri

November 24, 2003

Prepared for:

HAMILTON SUNDSTRAND CORPORATION
4747 Harrison Avenue
Rockford, Illinois 61125

Submitted by:



SECOR International Incorporated
400 Bruns Lane
Springfield, IL 62702

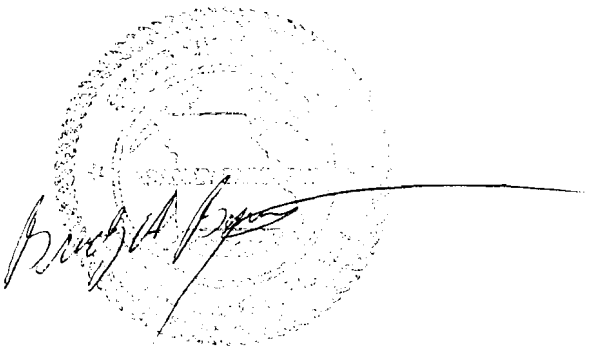
REMEDIAL INVESTIGATION
SUMMARY REPORT
FORMER HULETT LAGOON
CAMDENTON, MISSOURI

SECOR International Incorporated (SECOR) is submitting this Remedial Investigation (RI) Summary Report to Hamilton Sundstrand (HS). The Summary Report was prepared by SECOR to help meet the requirements of the Missouri Department of Natural Resources (MDNR) for addressing sites impacted by hazardous substances. The Summary Report has been prepared in general accordance with applicable guidance prepared by the United State Environmental Protection Agency (USEPA) for activities at sites subject to the Comprehensive Environmental Response and Compensation and Liability Act (CERCLA) in terms of the methods used and the information presented. If you have any questions or comments concerning this Summary Report, please contact either of the individuals listed below.

Respectfully submitted,

Mr. Bradley A. Barquest, R.G.
SECOR - Principal Hydrogeologist
Missouri RG 0188

Mr. John G. Hooker
SECOR – Managing Principal
Project Manager



EXECUTIVE SUMMARY

INTRODUCTION

This Summary Report has been prepared to highlight the findings of a Remedial Investigation (RI) conducted by Hamilton Sundstrand (HS) at the former Hulett Lagoon in Camdenton, Missouri. The Summary Report discusses RI planning, field activities completed, technical findings, and conclusions.

Although the RI was conducted by HS, the City of Camdenton, Missouri's (City) support and cooperation with RI planning, logistical efforts to support field activities, and use of City resources (labor, equipment, and facilities) were instrumental in the successful completion of the activities discussed in this Summary Report.

BACKGROUND INFORMATION

The City operated a series of five independent lagoons (located in and around the City) for the treatment of wastewater and sewage prior to construction of the City's Publicly Owned Treatment Works (POTW). One of these lagoons, referred to as the Hulett Lagoon (Lagoon #3) (former lagoon), was located about 1,000 feet northeast of the former Sundstrand Tubular Products facility (owned and operated by Modine Manufacturing, Inc. (Modine) since 1990, and referred herein as the Facility). During the former lagoon's operational period (1961 through 1989), it received a combination of residential and commercial wastes from various sources via collection sewers and industrial wastes from a dedicated sewer line from the Facility as reported by the Missouri Department of Natural Resources (MDNR). The former lagoon was decommissioned in late l989 by removing sludge, removing inlet and outfall structures, and regrading the lagoon area by using excavated lagoon sidewalls as borrow material.

As a result of several environmental investigations (most notably investigations conducted by MDNR) it was determined that soil and groundwater in and around the

former lagoon were impacted by volatile organic compounds (VOCs). These impacts were believed to be attributed to operations at the Facility, and the subsequent discharge of wastewater (containing VOCs) to the former lagoon.

The Mulberry Street Municipal well (Mulberry well), part of the City's potable water system at one time, is located south of the former lagoon. Concentrations of VOCs, specifically, trichloroethene (TCE), above USEPA Maximum Contaminant Levels (MCLs) required the City to remove the Mulberry well as part of the potable water system.

REMEDIAL INVESTIGATION

HS conducted the RI to address the occurrence and distribution of soil and groundwater contamination at, and in the vicinity of the former lagoon that may have impacted the Mulberry well.

The RI was initially based on a scope of work approved by MDNR (reference RI Work Plan dated May 20, 2000). As a result of initial field findings, it was determined that two hydrogeologic units (a shallow or "perched zone" and a "deep" aquifer) existed within the regional area. In order to better define the extent of groundwater impacts in the region, subsequent scopes of work were prepared and approved by MDNR. Three RI phases were completed.

The RI was part of an overall objective to help protect the City's potable water supply system. The RI activities were designed to help determine potential impacts to the Mulberry well from the former lagoon, and provide a practical monitoring system that allows early detection of potential contaminants prior to their reaching the City's Blair Street Municipal well, part of the City's potable water system, located southwest of the former lagoon.

REMEDIAL INVESTIGATION ACTIVITIES

Phase I of the RI focused on characterization of near surface soils in the vicinity of the former lagoon, characterization and distribution of groundwater contamination associated with the former lagoon, confirmation of the constituents of concern, evaluation of natural attenuation processes within the aquifer system, and evaluation of potential receptors (if appropriate). Activities performed to meet these objectives included sampling and analysis of soils in the former lagoon area, installation of several monitoring wells in and adjacent to the former lagoon, sampling and analysis of groundwater for select analytes and parameters, and performance of aquifer response tests.

Phase II of the RI focused on better defining the "perched zone" and the "deep" aquifer, the extent of groundwater contamination, and reassessing select contaminants of concern (most notably hexavalent chromium). Activities performed to meet these objectives included installation of several monitoring wells in and adjacent to the former lagoon, sampling and analysis of groundwater for select analytes and parameters, and performance of aquifer response tests.

Phase III of the RI focused on determining the extent of VOC contamination in the "deep" aquifer and in collecting data which could be used to determine if the Mulberry well could be used to continue providing hydraulic containment for the "deep" aquifer. Activities performed to meet these objectives included installation of several monitoring wells in and adjacent to the former lagoon, sampling and analysis of groundwater for select analytes and parameters, and performance of aquifer response tests.

REMEDIAL INVESTIGATION RESULTS

Soil investigation activities within the former lagoon identified concentrations of TCE and DCE above detection limits in one soil boring at a depth of about 9 feet below ground surface (bgs). TCLP analysis of soil samples reported no VOCs above detection limits.

TCLP analysis of RCRA metals only identified barium at concentrations slightly above detection limits.

Based upon the presence of impacted soils in very limited, isolated areas, the minimal potential for exposure to humans (due to contaminant's location at depth), and the apparent non-existent likelihood of VOCs leaching into groundwater at levels above regulatory limits, the need for soil remedial activities does not appear to be warranted.

Based upon RI activities, the presence of two groundwater zones beneath the former lagoon (and surrounding areas) was identified. These groundwater systems consist of a thin perched groundwater zone referred to as the "perched zone" and the underlying "deep" aquifer.

Results of contaminant concentration and distribution data suggest that the majority of contaminant mass (VOCs) has accumulated within the "perched zone" due in part to the presence of a low permeability zone that inhibits vertical migration and forms the base of the "perched zone" system. This low permeability zone appears to be laterally continuous across the former lagoon (and surrounding areas) and likely influences horizontal groundwater and contaminant migration within the "perched zone" system. Groundwater contamination detected within the "deep" aquifer appears to be a result of the vertical migration through the overlying low permeability zone. Vertical contaminant migration between the aquifer systems may have been influenced by the presence of two monitoring wells (MW-3 and MW-4) at the Facility that were completed as open boreholes through both the "perched zone" and "deep" aquifer. These wells were decommissioned by Modine in 2002, and the potential for these two wells to be a pathway for contaminant migration has been eliminated. The lateral extent of the VOC plume in the "deep" aquifer appears to have been defined during the Phase III activities.

Results from aquifer response tests indicate that the stresses generated by groundwater extraction from the Mulberry well are measurable within the "deep" aquifer

system. Measured drawdowns associated with the tests suggest that hydraulic influences are exerted within the "deep" aquifer beyond the former lagoon locations, and beyond the wells exhibiting impacts in the "deep" aquifer. The result of the aquifer testing combined with observations of fracture orientations at several bedrock outcrop locations along ravines near the Facility and the former lagoon suggests that preferential flow might be occurring in the "deep" aquifer. Of greater importance, the data demonstrates that the City's historical pumping activities at the Mulberry well have changed the hydraulic regime of the "deep" aquifer and affected (and most likely prevented) further contaminant migration.

CONCURRENT CORRECTIVE ACTIONS

Although the RI focuses primarily on the former lagoon as a potential source of groundwater impacts, Modine has been addressing soil and groundwater impacts at the Facility as part of a RCRA Corrective Action in accordance with an Abatement Order on Consent (AOC) with MDNR. Soil and groundwater had been found to be impacted with VOCs (most notably TCE).

Modine began investigating the nature and extent of impacts of VOCs in soils at the Facility in July, 1999. Modine's investigative efforts led to removal activities in the fall of 2001 and the spring of 2002 where up to 7,426 tons of soil impacted with chlorinated VOCs in excess of MDNR Cleanup Levels for Missouri (CALM) Soil Target Concentrations (STARC) Leaching to Groundwater (C_{LEACH}) levels was excavated and disposed of as special waste.

Based upon the investigative and removal activities, alternative site-specific cleanup action levels were developed (based on Synthetic Precipitation Leaching Procedure (SPLP) and Appendix C-Tier 2 Cleanup Levels of CALM) and approved by MDNR. It is HS' understanding that MDNR concurs that soil remediation objectives at the Facility have been met.

SUMMARY

The RI activities have provided a better understanding of the extent of contaminant distribution in the "perched zone" system (most notably near the former lagoon). Of great importance, the RI (along with Modine's efforts) suggests that groundwater impacts are more of a regional issue and cannot be differentiated (in terms of contribution) between the former lagoon and historical operations at the Facility.

The "perched zone" represents a thin, perched groundwater zone that occasionally has not produced sufficient groundwater quantities to accommodate monitoring activities (monitoring well sampling, aquifer response testing, etc.). This suggests that future active remedial actions may not be practical and may not be possible due to the following conditions:

- Excessive depth to the "perched zone" (ranging between 110 and 180 feet bgs); that prohibits effective and/or efficient implementation of either ex-situ or in-situ remedial options
- Limited saturated thickness that limit potential effective capture zones associated with extraction systems;
- Low (unsustainable) perched groundwater yields at flow rates (wells typically purged dry during sampling activities);

The combination of the above "perched zone" conditions result in a system that is not conducive to conventional extraction technologies (either fluid and/or vapor), or the introduction of reagents to promote chemical oxidation or augment natural attenuation processes.

Current local groundwater usage would also suggest that exposure pathways from the "perched zone" are remote at best. As mentioned previously, City residents receive potable water from the City's municipal well system (except for the Mulberry well), which draws from the deeper aquifers. Usage of the "perched zone" by residents in the former

lagoon area does not appear to occur. One exception may be the Burnau well on Benttree Avenue. Although it is uncertain whether this well may be screened in the "perched zone," abandoning this currently non-operational private well will eliminate an exposure pathway. Additionally, the "perched zone" is not an aquifer from a practical public use perspective (as a potable water source), nor from a regulatory perspective. Missouri regulations state that the "perched zone" is not defined as an aquifer as the perched unit does not store or transmit water in recoverable quantities sufficient to be utilized, or that could be utilized, as a water source for private or public use (reference Title 10 CSR 20-2.010).

With the aforementioned thoughts in mind, coupled with the presence of complex geological/hydrogeological conditions, practical options for addressing groundwater impacts to the "deep" aquifer are a challenge. Fortunately for the City, the continued use of the Mulberry well (with institutional controls) should provide effective hydraulic containment of VOCs (regardless of the sources) in the "deep" aquifer. Continued pumping of the Mulberry well should provide a practical measure to prevent impacted groundwater from migrating and potentially impacting other City potable wells (most notably the Blair well).

One of the goals stated in the RI Work Plan was to identify data gaps in order to understand the nature and extent of contamination at the former lagoon. Although identified data gaps were eliminated in the first RI phase, additional data gaps were identified resulting in subsequent RI phases being completed in order to eliminate these gaps. HS' efforts to date (coupled to a certain extent with Modine's efforts) have eliminated the reasonable data gaps needed to understand the nature and extent of impacts at the former lagoon and the surrounding region. Sufficient data does exist to complete a feasibility study (FS).

The RI does appear to provide sufficient information to the nature and extent of groundwater contamination from VOCs, and should provide the basis for evaluating

remedial alternatives that are practical and reflective of the risks to humans and the environment.

TABLE OF CONTENTS

SECTION	PAGE NO.
SECTION 1.0 INTRODUCTION	**1-1**
PROJECT OBJECTIVES	1-1
RI SUMMARY REPORT ORGANIZATION	1-3
SECTION 2.0 BACKGROUND INFORMATION	**2-1**
INTRODUCTION	2-1
FORMER HULETT LAGOON HISTORY	2-1
Location	2-1
General History	2-3
ENVIRONMENTAL SETTING	2-5
Land Use	2-5
Topography and Surface Drainage	2-5
Climate	2-5
SURFACE WATER	2-6
GEOLOGY	2-6
HYDROGEOLOGY	2-8
LOCAL GROUNDWATER USE AND HISTORY	2-9
PREVIOUS ENVIRONMENTAL INVESTIGATIONS	2-10
Facility Investigations	2-12
SECTION 3.0 FIELD ACTIVITIES	**3-1**
INTRODUCTION	3-1
PHASE I FIELD ACTIVITIES	3-1
Phase I Former Hulett Lagoon Soils Assessment	3-1
Phase I Monitoring Well Installation	3-4
Phase I Groundwater Monitoring Activities	3-8

SECTION	PAGE NO.
Monitoring Wells	3-8
Mulberry Well	3-9
Groundwater Analytical Methodologies	3-9
Phase I Aquifer Response Tests	3-10
Pre-Test Period	3-10
Step Test Period	3-11
Constant Rate Test Period	3-12
Post-Test Recovery Period	3-13
Natural Attenuation	3-13
PHASE II FIELD ACTIVITIES	3-14
Rationale	3-14
Phase II Monitoring Well Installation	3-15
Phase II Geophysical Well Logging	3-17
Natural Gamma-Ray Logging	3-18
Density Logging	3-18
Neutron Logging	3-19
Resistivity Logging	3-20
Phase II Groundwater Monitoring Activities	3-20
Monitoring Wells	3-20
Mulberry Well	3-21
Groundwater Analytical Methodologies	3-21
Phase II Aquifer Response Tests	3-22
Pre-Test Period	3-22
Constant Rate Test Period	3-22
Post Test Recovery Period	3-23
PHASE III FIELD ACTIVITIES	3-24
Rationale	3-24
Phase III Monitoring Well Installation	3-25

SECTION	PAGE NO.
Phase III Groundwater Monitoring Activities	3-27
Monitoring Wells	3-27
Mulberry Well	3-27
Phase III Groundwater Analytical Methodologies	3-28
Phase III Aquifer Response Tests	3-28
Pre-Test Period	3-28
Variable Rate Test Period	3-29
Constant Rate Test Period	3-30
Post Test Recovery Period	3-31
SUBSEQUENT PHASE III ACTIVITIES	3-31
Rationale	3-31
Monitoring Well Installation (December 2002)	3-32
Aquifer Response Test (January 2003)	3-33
Pre-Test Period	3-33
Constant Rate Test Period	3-34
Post Test Recovery Period	3-35
Fracture Orientation	3-35
Subsequent Geophysical Well Logging	3-35
Monitoring Well Installation (June 2003)	3-36
Groundwater Monitoring Activities (June 2003)	3-37
Monitoring Wells	3-37
Mulberry Well	3-38
Groundwater Analytical Methodologies	3-38
Aquifer Response Test (July-August 2003)	3-38
Pre-Test Period	3-38
Constant Rate Test Period	3-39
Post-Test Recovery Period	3-40
LABORATORY ANALYSIS	3-40

SECTION	PAGE NO.
SECTION 4.0 FINDINGS	**4-1**
LAGOON SOILS ASSESSMENT	4-1
Former Hulett Lagoon Soils	4-1
Soils Analytical Results	4-1
GEOPHYSICAL WELL DATA	4-4
FORMER HULETT LAGOON GEOLOGY	4-6
Fracture Orientation	4-7
GROUNDWATER ANALYTICAL RESULTS	4-10
Phase I Monitoring Well Analytical Results	4-10
Phase II Monitoring Well Analytical Results	4-11
Phase III Monitoring Well Analytical Results	4-15
Mulberry Well Analytical Results	4-20
Investigation Derived Waste Analytical Results	4-20
AQUIFER RESPONSE	4-20
Phase I Aquifer Tests	4-20
Phase II Aquifer Tests	4-23
Phase III Aquifer Tests	4-26
Subsequent Phase III Aquifer Tests	4-27
GROUNDWATER CHARACTERISTICS	4-27
Groundwater Occurrence	4-28
"Perched Zone"	4-28
"Deep" Aquifer	4-31
Groundwater Level Fluctuation	4-31
Horizontal Hydraulic Gradient	4-31
NATURAL ATTENUATION	4-33
Groundwater In-situ Findings	4-33
Groundwater System Analytical Findings	4-33
INVESTIGATION DERIVED WASTE	4-34

SECTION	PAGE NO.
SECTION 5.0 SUMMARY AND CONCLUSIONS	**5-1**
SUMMARY	5-1
Soil Investigation	5-1
Groundwater Investigation	5-1
Natural Attenuation	5-3
Constituents of Concern	5-4
VOCs	5-4
Metals	5-4
SUMMARY OF FINDINGS	5-5
Former Lagoon	5-5
Groundwater Characteristics	5-6
Extent of Groundwater Contamination	5-8
CONCLUSION	5-12

FIGURES

		PAGE NO.
Figure 1.1	Site Location Map	1-2
Figure 2.1	Configuration Map	2-2
Figure 2.2	Monitoring Well Location Map	2-7
Figure 2.3	Historical Ground Water Analytical Results	2-11
Figure 3.1	Hulett Lagoon – Soil Boring Location Map	3-3
Figure 4.1	Soil Analytical Results – Former Lagoon Area	4-3
Figure 4.2	Base of Low Permeability Zone	4-8
Figure 4.3	Fracture Orientation Map	4-9
Figure 4.4	Groundwater Analytical Results for "Perched Zone" and "Deep Aquifer"	4-19
Figure 4.5	Maximum Drawdown During Aquifer Tests for "Deep Aquifer"	4-25
Figure 4.6	Potentiometric Surface Map - "Perched Zone"	4-30
Figure 4.7	Potentiometric Surface Map - "Deep Aquifer"	4-32
Figure 5.1	Extent of TCE Plume - "Perched Zone"	5-9
Figure 5.2	Extent of TCE Plume - "Deep Aquifer"	5-10

TABLES

Table 3.1	Monitoring Well Locations	3-5
Table 4.1	Detected Analytes – Hulett Lagoon Soils	4-2
Table 4.2	Detected Analytes – Groundwater – Phase I	4-12, 13
Table 4.3	Detected Analytes – Groundwater – Phase II	4-16, 17
Table 4.4	Detected Analytes – Groundwater – Phase III	4-18
Table 4.5	Detected Analytes – Mulberry Well Discharge	4-21
Table 4.6	Detected Analytes – Investigation Derived Waste	4-22
Table 4.7	Maximum Drawdown Constant Rate Aquifer Tests	4-24
Table 4.8	Summary of Static Groundwater Potentiometric Surface Elevations	4-29
Table 4.9	Detected Analytes - Natural Attenuation Evaluation	4-35

APPENDICES

Appendix A Boring Logs and Well Construction Diagrams

Appendix B Aquifer Test Hydrographs

Appendix C Mulberry Well and Rainfall Data

Appendix D Geophysical Logs

Appendix E Fracture Orientation Summary

Volume II Laboratory Reports

SECTION 1.0
INTRODUCTION

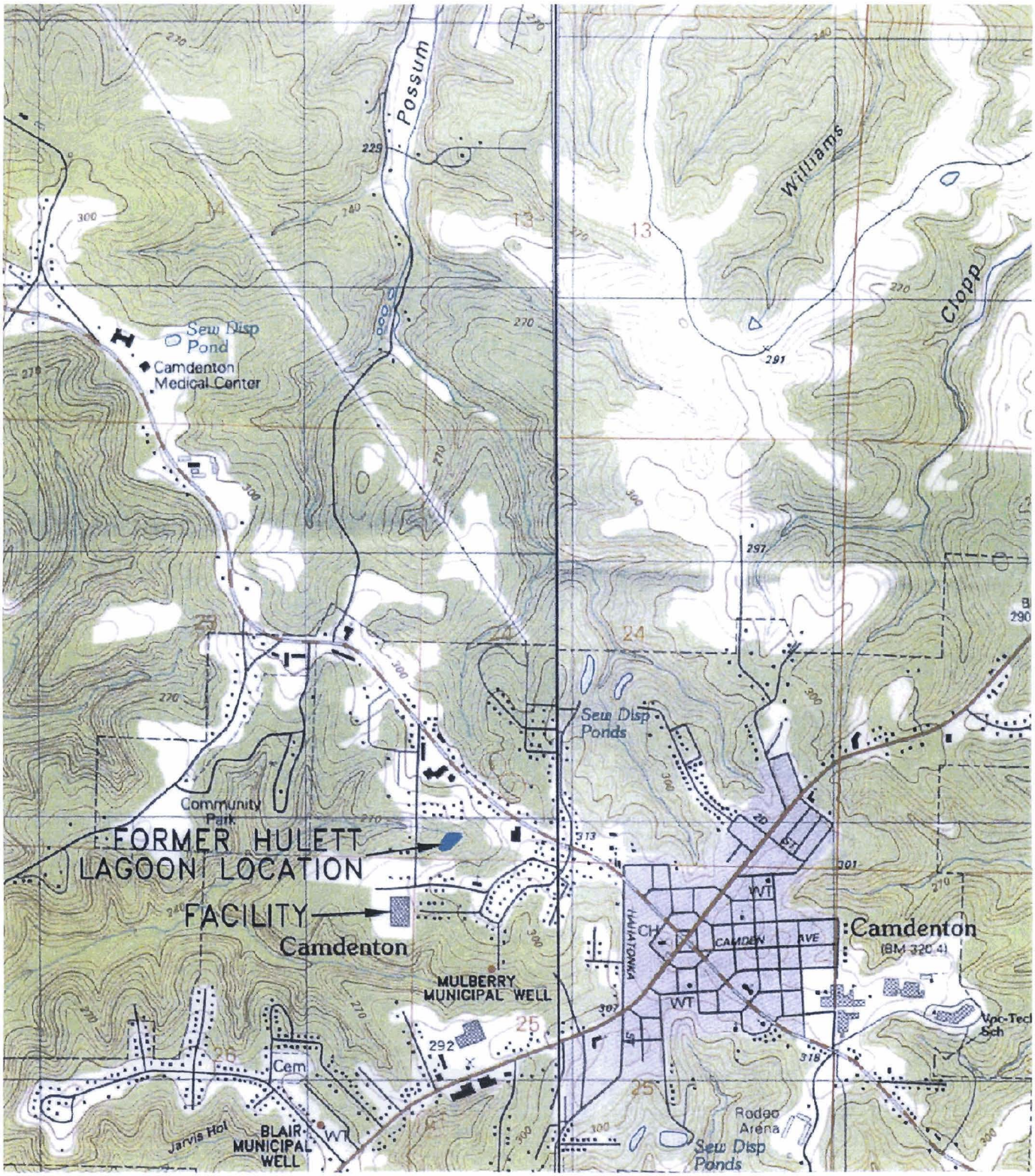
SECOR International Incorporated (SECOR) was authorized by Hamilton Sundstrand (HS) in March 2000 to prepare a focused Remedial Investigation (RI) Work Plan (Work Plan) to address the occurrence and distribution of soil and groundwater contamination at, and in the vicinity of, the former Hulett Lagoon (former lagoon) that may have impacted the Mulberry Street municipal well (Mulberry well) located in the City of Camdenton, Missouri (the City). The Work Plan was submitted to the Missouri Department of Natural Resources (MDNR) for review and approval. The subject of the RI is the former lagoon, located northeast of the intersection of Dawson Road and Sunset Drive in Camdenton, Camden County, Missouri (reference Figure 1.1).

Following verbal approval from MDNR, SECOR began Work Plan activities in May 2000, and completed RI field activities in August 2003. This Remedial Investigation Summary Report (Summary Report) describes activities conducted, highlights findings, and offers a summary and conclusions based on those findings.

Although the RI was conducted by HS, the City's support and cooperation with RI planning, logistical efforts to support field activities and the use of City resources (labor, equipment, and facilities) were instrumental in the successful completion of the activities discussed in this Summary Report.

PROJECT OBJECTIVES

The RI was completed to support an overall objective to help protect the City's potable water supply system. The RI activities were designed to help determine potential impacts to the Mulberry well from the former lagoon, and provide a practical monitoring system that allows early detection of potential contaminants prior to their reaching the City's Blair Street municipal well (Blair well). The Mulberry well was removed from the



DESIGNED BY: MGD	SECOR	SITE LOCATION MAP FORMER HULETT LAGOON HAMILTON SUNDSTRAND CAMDENTON, MISSOURI
DRAWN BY: WLG		
APPROVED BY: JDH		
DATE: 09-04-03		JOB NO. 61UN.03001.00 FIGURE 1.1

S:\PROJECTS\061.03 PROJECTS\61UN.03001.00\cad files\RI Summary SEPT 03\061 SITE LOCATION\figure 1.1.dwg wlg 09-04-03

City's potable water supply system due to the presence of trichloroethene (TCE) above maximum contaminant levels (MCLs).

RI SUMMARY REPORT ORGANIZATION

The Summary Report highlights the investigative activities, findings and associated conclusions of the RI. Section 1.0 provides a brief overview of the Summary Report's purpose and organization. Section 2.0 provides general background information about the former lagoon and adjacent areas, and regional and site hydrogeology. Section 3.0 describes RI field activities conducted including soil and groundwater sampling and analysis, and aquifer response testing. Section 4.0 discusses findings from RI field activities. Section 5.0 provides summary and conclusions based on the RI field activities, and other relevant technical data from Modine's RCRA Corrective Action Abatement Order on Consent (AOC). Additionally, boring logs, well construction diagrams, aquifer pumping tests results, municipal well data, geophysical logs, bedrock fracture information, and laboratory analytical reports are included as appendices.

SECTION 2.0
BACKGROUND INFORMATION

INTRODUCTION

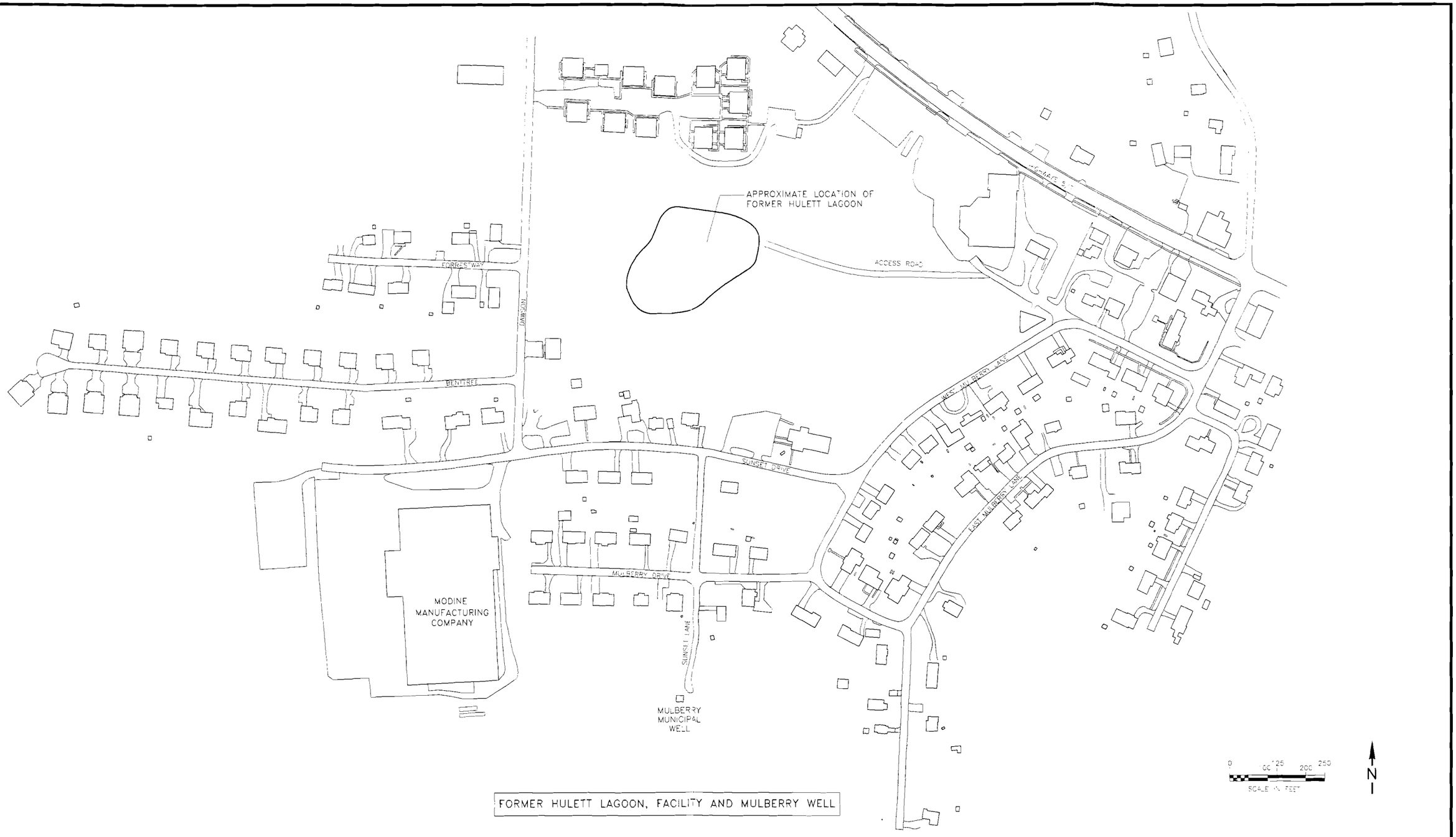
SECOR reviewed information regarding the former lagoon, including descriptions, operational history, decommissioning and closure, and previous investigation activities related to the former lagoon and the adjacent former Sundstrand Tubular Products facility (owned and operated by Modine Manufacturing Inc. (Modine) since 1990, and referred to herein as the Facility). Information included copies of environmental reports prepared for HS and copies of reports/correspondence from MDNR, and environmental reports prepared by other parties (i.e. Modine) made available to HS. This review was performed to gain further understanding of past activities and the current conditions at both the Facility and former lagoon. The reviewed background information formed the basis for the RI Work Plan and subsequent RI activities. The location of the former lagoon and the Mulberry well are shown in Figure 2.1.

FORMER HULETT LAGOON HISTORY

Location

The former lagoon is located northeast of the intersection of Dawson Road and Sunset Drive in the western portion of the City of Camdenton, Camden County, Missouri (reference Figure 1.1). The legal description of the parcel containing the former lagoon is as follows:

> A tract of land in Stewart's Subdivision described as beginning at a point in the South line of Lot 13 of Stewart's Subdivision located 222.6 feet East from the Southwest corner of said Lot 13; thence due North, a distance of 211.0 feet; thence bearing North 47 degrees, 45 minutes East, a distance of 305 Feet; thence bearing South 81 degrees 00 minutes East, a distance of 300.0 feet; thence bearing due South, a distance of 275.0 feet to a point on the South line of



FORMER HULETT LAGOON, FACILITY AND MULBERRY WELL

DESIGNED BY: JGH	SECOR	CONFIGURATION MAP FORMER HULETT LAGOON HAMILTON SUNDSTRAND CAMDENTON, MISSOURI
DRAWN BY: WLG		
APPROVED BY: JGH		
DATE: 10-14-03		JOB NO. 61UN.03001.00 FIGURE 2.1

S:\PROJECTS\061.03 PROJECTS\61UN.03001.00\cad files\RI Summary SEPT 03\061 figure 2.1\configuration.dwg wlg 10-14-03

said Lot 13; thence bearing due West, a distance of 516.6 feet, more or less to the point of beginning.

ALSO: Beginning at the center of Section 24, Township 38 North Range 17 West; thence bearing West, a distance of 800 feet to an iron pin; thence bearing South, a distance of 615.2 feet to an iron pin; thence bearing South 83 degrees 00 minutes East, a distance of 806 feet, to an iron pin in the Southwest corner of Lot 19, Williams Addition to Camdenton, Missouri; thence North, a distance of 715.2 feet to the beginning point, described area containing 12.2 acres, more or less.

The former lagoon was situated at latitude 38° 06' 40" North, longitude 92° 45' 10" West, and occupied an area of approximately one acre (reference Figure 2.1). The City has owned the property since before 1961 when the former lagoon was constructed.

General History

The former lagoon was constructed in 1961 under the State of Missouri Grants Program. The lagoon is reported to have been an above surface grade structure with sidewalls constructed of existing site and imported clay material. Sidewall heights were believed to be about 15 feet. Sidewall widths (at the base) were believed to be about 25 feet. The lagoon occupied an area of about 1 acre. The former lagoon treated wastewater in accordance with a National Pollution Discharge Elimination System (NPDES) permit issued to the City by MDNR (reference permit number MO-0048577). The permit was terminated following closure of the former lagoon. The former lagoon was operated and maintained by the City from 1961 to its approved closure by MDNR in late 1989. The following discussion presents a brief summary of pertinent activities associated with the former lagoon.

In 1961, following its construction, the former lagoon began receiving storm water from storm water basins and sewers located in the surrounding area.

From 1967 through 1986, the former lagoon received storm water, domestic sewage, and untreated wastewater known to have contained several waste streams including corrosive waste, wastewater treatment sludges from electroplating operations, waste oils, and residual contaminants associated with degreasing operations, including TCE from the Facility. These wastewaters were delivered to the lagoon via a City collection sewer and discharged to an intermittent drainage way north of the former lagoon in accordance with an NPDES permit issued by MDNR.

On April 14, 1986, the Facility pretreatment plant became operational, effectively reducing contaminants associated with the Facility from being discharged to the former lagoon.

Missouri Engineering Corporation (MEC) was retained by the City in 1988 to assist with the closure of the former lagoon. On May 26, 1988, the MDNR provided the City with several options for disposal/management of former lagoon sludges. One of these options was selected by the City, and the City authorized MEC to begin closure activities.

On February 22, 1989, the MDNR approved the closure of the former lagoon. Between March and May 1989, MEC prepared and submitted "Specifications and Contract Documents for the Removal and Stock Piling of Sludge from the Hulett Lagoon".

On July 21, 1989, MEC coordinated the removal of sludges from the former lagoon and application on a 22-acre area at the municipal airport located south of the City. It is believed that after sludge was removed from the lagoon, the lagoon inlet and outfall structures were removed. The lagoon area was regraded using material excavated from the lagoon sidewalls.

On April 9, 1990, the City provided the MDNR with a Hulett Lagoon Sludge Disposal Work Completion Summary.

The former lagoon location is not utilized for any activities, and has not been utilized since the former lagoon was decommissioned and closed in 1989. The former lagoon location is a generally flat, open field covered with native vegetation, owned and maintained by the City.

ENVIRONMENTAL SETTING

Land Use

The former lagoon is surrounded by undeveloped wooded land, residential and commercial properties. The former lagoon site is now a generally flat, open field covered with native vegetation with surface runoff toward the northwest entering intermittent drainages that trend to the west. An apartment complex is located north of the former lagoon. The former lagoon is bordered on the west by a wooded area about 500 feet wide and beyond by Dawson Road and residences. Wooded areas border the south and east of the former lagoon area with residences beyond the southern wooded border, and commercial property (along Missouri State Highway 5 and 7) beyond the eastern wooded border (reference Figure 2.1).

Topography and Surface Drainage

The topographic expression in the Camdenton area, and throughout most of southern Missouri, is undulating. The former lagoon area is located at an approximate elevation of 960 feet above mean sea level (amsl) and is in an area of relatively flat lying topography (i.e., situated near the top of a ridgeline). Surface drainage is toward the west-northwest toward an intermittent drainage that forms the northern border and grades from east to west (reference Figure 2.1).

Climate

The Camdenton area receives an average of approximately 42 inches of precipitation per year, with average annual snowfalls consisting of 19 inches.

The maximum expected two-year, 24-hour rainfall total is approximately 3.5 inches. The average daily summer temperature is approximately 77° Fahrenheit (F) with an average winter temperature of 35° F. Average wind speed and direction for the area is reported as 10 miles per hour from the south.

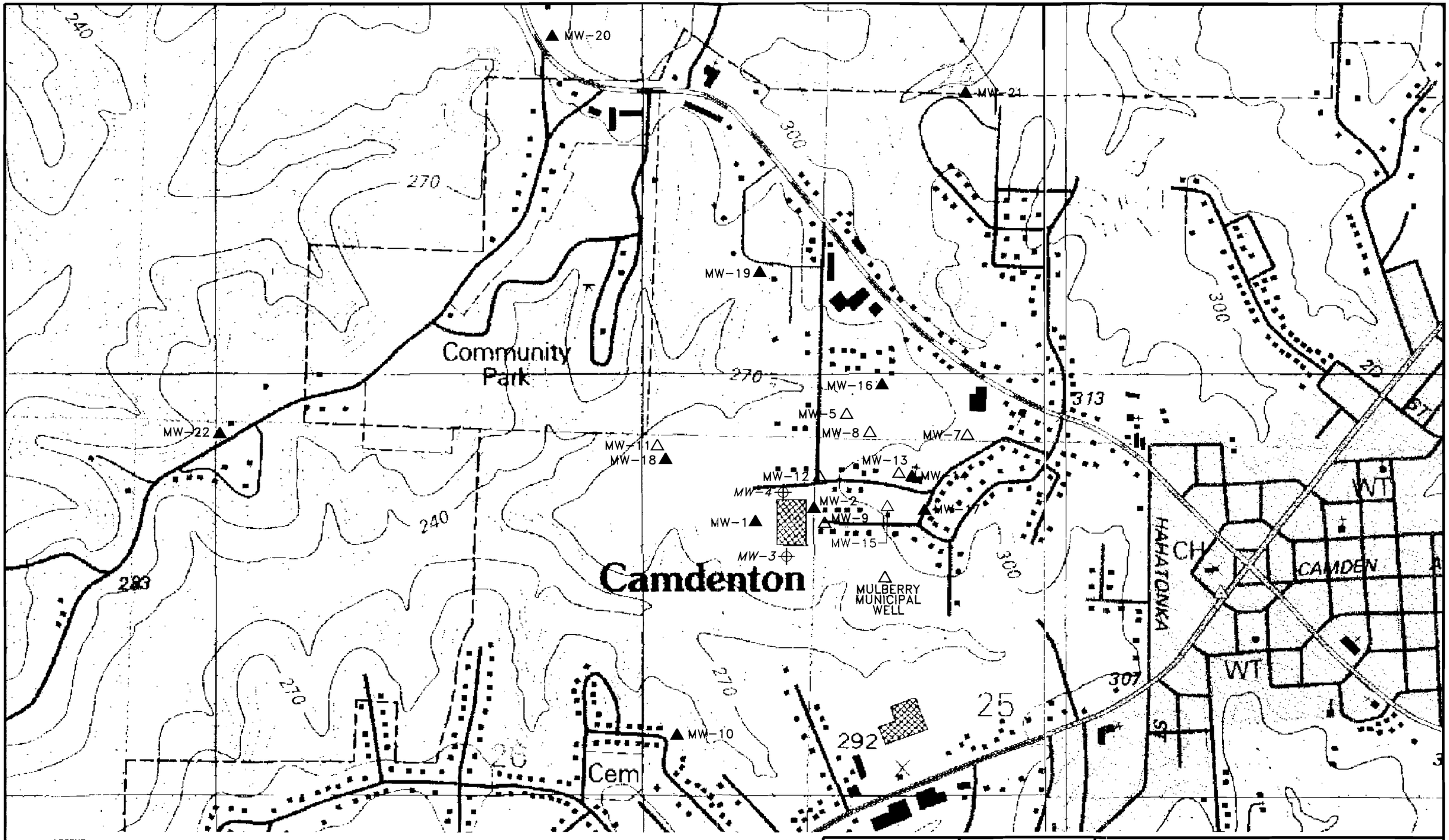
SURFACE WATER

Surface water uses in the area are dominated by recreational activities, with much of this activity being conducted on nearby Lake of the Ozarks. The nearest surface water body to the former lagoon is the Niangua Arm of the Lake of the Ozarks, located approximately 1.5 miles west of the former lagoon. Due to the topographic expression in the vicinity of the former lagoon, surface drainage associated with precipitation events would be toward the west (i.e., the Niangua Arm of the Lake of the Ozarks) via deeply incised ephemeral streams. Figure 2.2 depicts the general locations of the former lagoon and associated surface water locations.

GEOLOGY

The Camdenton area, and much of southern Missouri, is characterized by non-glaciated carbonate terrace. Much of the surface sediments present in these non-glaciated areas are related directly to the weathering of limestone and dolomite bedrock. The near surface bedrock is comprised primarily of Cambrian-Age dolomite, sandy dolomite and sandstone that were deposited in a sedimentary basin known as the Central Missouri Basin. To the west lies the north/south trending Lebanon Arch that consists of carbonate platform rocks that overlie Precambrian Highlands. In general, shaleier, basinal rocks to the east pinch-out against the Lebanon Arch. The youngest bedrock formations beneath the former lagoon area consist of Ordovician-Age sediments (Roubidoux Formation) assigned to the Canadian Series.

The Roubidoux Formation consists of dolomite, sandy dolomite and sandstone. In the Camdenton area, soluble portions of the Roubidoux have generally been removed by



LEGEND:

MW-18 ▲ DEEP WELL
MW-12 △ SHALLOW WELL
MW-15 △ SHALLOW WELL (ABANDONED)
MW-3 ⊕ MODINE DEEP WELL (ABANDONED)

0 700 1400
SCALE IN FEET

NORTH

REFERENCE: USGS 7.5 MINUTE QUADRANGLE: GREEN BAY TERRACE, MO 1983
USGS 7.5 MINUTE QUADRANGLE: CAMDENTON, MO 1983

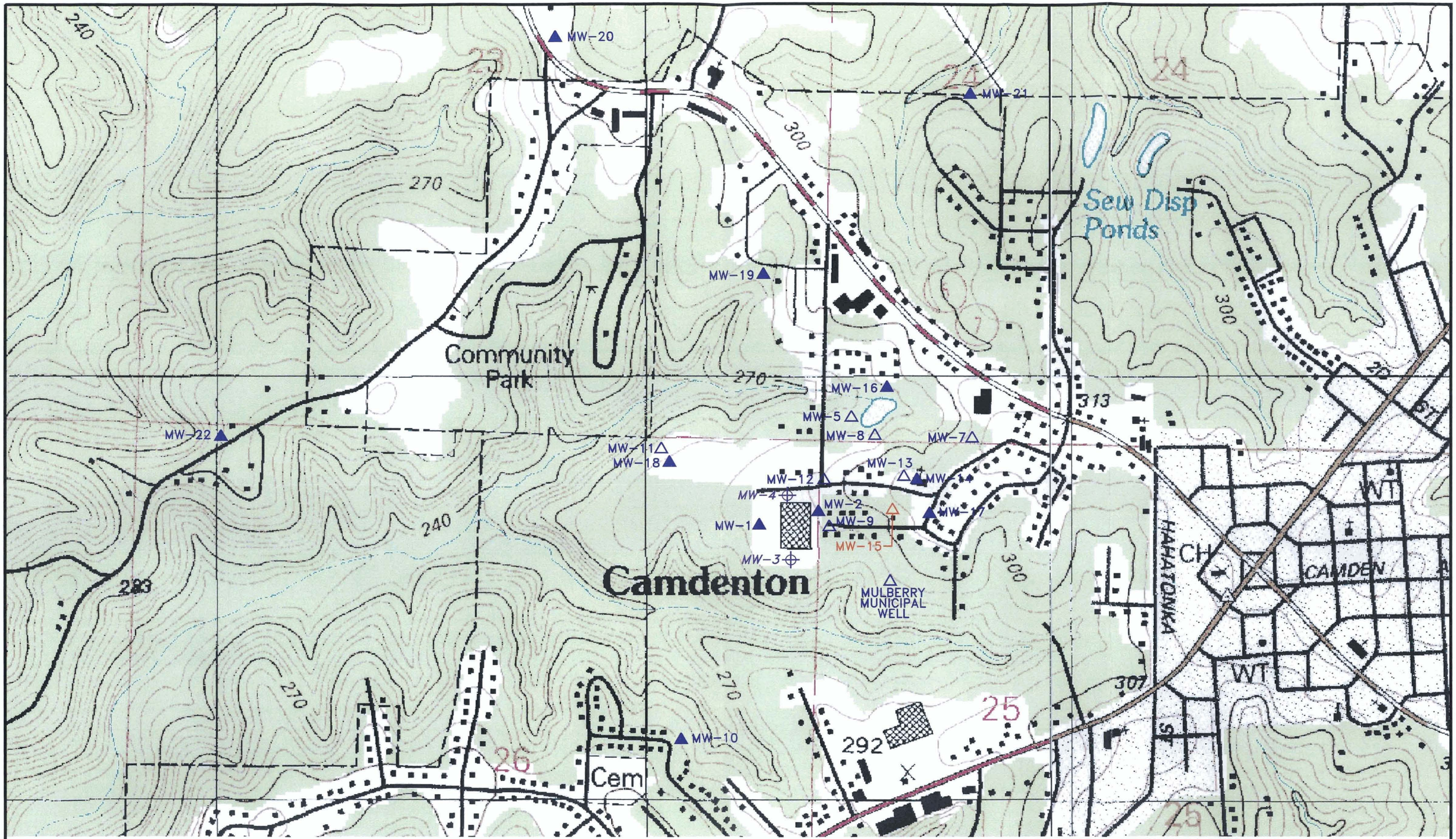
DESIGNED BY:	MGD
DRAWN BY:	GLH
APPROVED BY:	MGD
DATE:	08-29-03

SECOR

SITE AREA TOPOGRAPHIC MAP SHOWING
MONITORING WELL LOCATIONS
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE 2.2

S:\PROJECTS\061.03 Projects\61UN.03001.00\cad files\RI Summary SEPT 03\061 usgs figures\usgs-potmap.dwg wlg 07-11-03



LEGEND:

MW-18 ▲ DEEP WELL
MW-12 △ SHALLOW WELL
MW-15 △ SHALLOW WELL (ABANDONED)
MW-3 ⊕ MODINE DEEP WELL (ABANDONED)

0 700 1400
SCALE IN FEET

NORTH

REFERENCE: USGS 7.5 MINUTE QUADRANGLE: GREEN BAY TERRACE, MO 1983
USGS 7.5 MINUTE QUADRANGLE: CAMDENTON, MO 1983

DESIGNED BY:	MGD
DRAWN BY:	GLH
APPROVED BY:	MGD
DATE:	08-29-03

SECOR

SITE AREA TOPOGRAPHIC MAP SHOWING
MONITORING WELL LOCATIONS
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE 2.2

S:\PROJECTS\061.03 Projects\61UN.03001.00\cad files\RI Summary SEPT 03\061 usgs figures\usgs-potmap.dwg wlg 07-11-03

dissolution. Nearby well logs indicate the Roubidoux Formation may have been completely removed by erosion in the vicinity of the former lagoon site. The geologic map of Missouri indicates that the Gasconade Dolomite is the near surface bedrock at or directly west of the former lagoon location. Underlying the Roubidoux Formation is the Gasconade Dolomite, which consists of cherty Dolomite estimated to be approximately 300 feet thick. A basal unit of the Gasconade Dolomite, known as the Gunter Sandstone member, commonly separates the Ordovician and Cambrian-Aged strata, and is estimated to be approximately 25 feet thick in the Camdenton Area. Underlying the Gunter Sandstone is the Cambrian-Aged Eminence Dolomite, which consists of 300 to 635 feet of dolomite with minor amounts of chert. The Eminence Dolomite is underlain by about 25-230 feet of Potosi Dolomite, which consists of dolomite, chert and drusy quartz. Underlying the Potosi Dolomite in descending order are the Derby-Doerun Dolomite, the shaley Davis Formation, the Bonneterre Formation, and the Lamotte Sandstone. The entire Cambrian section is estimated to be over 1,150 feet thick. Notable geologic features in the area include Hahatonka Spring and associated features that represent a collapsed cave structure, and the Decatureville Structure to the south, which may represent a meteor impact.

HYDROGEOLOGY

Shallow, sporadic, non-potable groundwater may occur in thin discontinuous zones perched directly atop first encountered bedrock. These zones are generally localized and many are seasonal. The principal potable aquifer in the Camdenton area is the Ozark Aquifer. The Ozark Aquifer includes all bedrock units located above the Cambrian-Age Derby-Doerun Dolomite. The Ozark Aquifer is considered exposed at land surface at the former lagoon location. The total thickness of the aquifer is approximately 950 feet in the Camdenton area. Each of the units which comprise the Ozark Aquifer have individual characteristics that control their water-bearing capabilities; however, in general, the Ozark Aquifers produce good quality water with production rates proportional to well depth. Extensive pumping of groundwater in the Camdenton area has created a downward vertical gradient, and the Camdenton area

may be considered a groundwater recharge zone. The Gunter Sandstone is generally highly porous and permeable and is an important source of domestic groundwater supply in the area. Because the Gunter Sandstone generally yields adequate domestic water supplies, few private wells in the area penetrate the underlying Cambrian Formations. The Eminence and Potosi Dolomites are a major source of municipal drinking water throughout the region, including the City. The Eminence Dolomite is differentiated from the underlying Potosi Dolomite by the lack of druse. Druse is a cavity within the rock that is encrusted with finely crystalline quartz. The druse-rich Potosi Dolomite is the most permeable geologic unit within the Ozark Aquifer and may exhibit extensive karst features. The shallowest reliable aquitard in the area is the St. Francois confining unit located at a depth of approximately 1,200 feet below land surface. This aquitard separates the Ozark Aquifer from the deeper St. Francois Aquifer. The St. Francois Aquifer includes the Cambrian-Age Bonterre and Lamotte Sandstone Formations. The St. Francois Aquifer is not used as a water source in the Camdenton area.

LOCAL GROUNDWATER USE AND HISTORY

The City's potable water needs are provided by a series of municipal wells located in and around the Camdenton area. These wells (known locally as the Hickory, Rodeo and Blair wells) range in depth from 800 to 1100 feet below ground surface (bgs). These wells were constructed from 1936 to 1997. These wells are operated cyclically or based upon usage demands.

The Mulberry well was part of the municipal well system until TCE levels above USEPA Safe Drinking Water Act standards were detected (notably after the installation of select Facility monitoring wells). The Mulberry well was drilled in 1986 to a depth of about 900 feet bgs and cased at a depth of about 400 feet bgs. The City currently operates the Mulberry well periodically in an effort to contain TCE in the general area of the Mulberry well and to prevent TCE migration to other City wells (most notably the Blair well).

Groundwater is extracted at the Mulberry well and discharged to an MDNR NPDES-permitted discharge point next to the Mulberry well pump house.

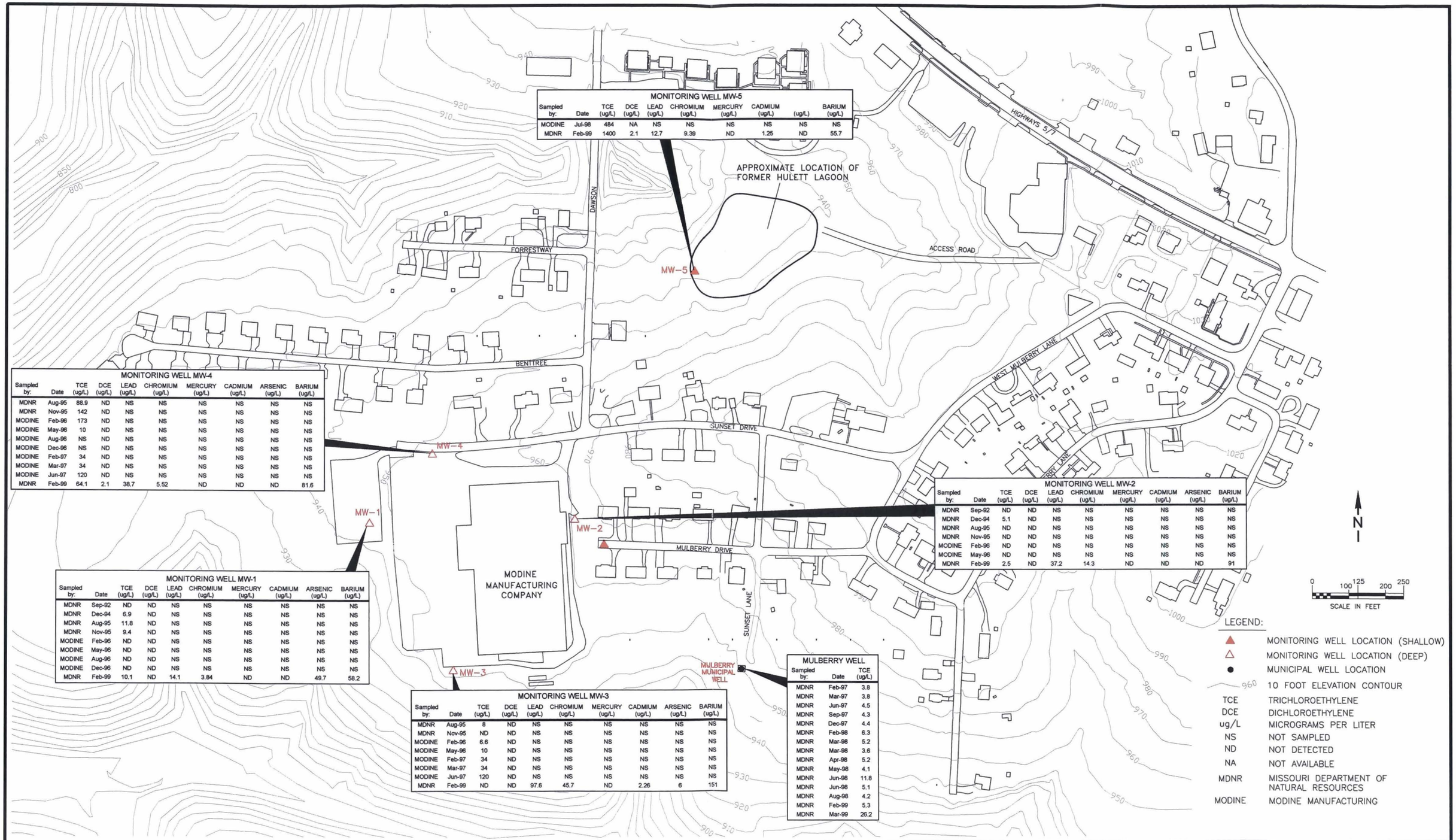
City residences are required through local ordinances to receive potable water from the municipal system. There are a few private wells within the City, but none are believed (based on discussions with City representatives) to be used for consumption. One private well in particular, located immediately north of the Facility along Benttree Street (known as the Burnau well), has had historical occurrences of VOCs detected. Although the well is not abandoned, it is believed the well is not operational, and is not used for consumption.

PREVIOUS ENVIRONMENTAL INVESTIGATIONS

Since the early 1980's, several environmental assessments and investigations have been performed in association with the former lagoon, the surrounding area, and the detection of groundwater contamination within this portion of the City (in particular the Mulberry well). Various parties performed these activities with specific objectives ranging from due diligence activities to responses to regulatory inquiries/requests.

Most of these previous investigations have identified groundwater impacts from VOCs (TCE in particular). As early as 1994, groundwater sampling and analysis has detected VOCs from monitoring wells installed at the Facility, the former lagoon, and the Mulberry well. Monitoring well locations and the Mulberry well are shown in Figure 2.2. A summary of historical detected analytes from the aforementioned sampling locations (based on historical information reviewed) is shown in Figure 2.3.

Historical discharges of wastewater to the former lagoon, the presence of TCE in groundwater at the former lagoon, and the presence of TCE in the Mulberry well south of the former lagoon led MDNR (through their investigative actions) to consider a potential relationship between the former lagoon and/or other sites that may be contributing to soil and groundwater impacts. Based upon information reviewed, it



MONITORING WELL MW-5

Sampled by:	Date	TCE (ug/L)	DCE (ug/L)	LEAD (ug/L)	CHROMIUM (ug/L)	MERCURY (ug/L)	CADMIUM (ug/L)	(ug/L)	BARIUM (ug/L)
MODINE	Jul-98	484	NA	NS	NS	NS	NS	NS	NS
MDNR	Feb-99	1400	2.1	12.7	9.39	ND	1.25	ND	55.7

MONITORING WELL MW-4

Sampled by:	Date	TCE (ug/L)	DCE (ug/L)	LEAD (ug/L)	CHROMIUM (ug/L)	MERCURY (ug/L)	CADMIUM (ug/L)	ARSENIC (ug/L)	BARIUM (ug/L)
MDNR	Aug-95	88.9	ND	NS	NS	NS	NS	NS	NS
MDNR	Nov-95	142	ND	NS	NS	NS	NS	NS	NS
MODINE	Feb-96	173	ND	NS	NS	NS	NS	NS	NS
MODINE	May-96	10	ND	NS	NS	NS	NS	NS	NS
MODINE	Aug-96	NS	ND	NS	NS	NS	NS	NS	NS
MODINE	Dec-96	NS	ND	NS	NS	NS	NS	NS	NS
MODINE	Feb-97	34	ND	NS	NS	NS	NS	NS	NS
MODINE	Mar-97	34	ND	NS	NS	NS	NS	NS	NS
MODINE	Jun-97	120	ND	NS	NS	NS	NS	NS	NS
MDNR	Feb-99	64.1	2.1	38.7	5.52	ND	ND	ND	81.6

MONITORING WELL MW-2

Sampled by:	Date	TCE (ug/L)	DCE (ug/L)	LEAD (ug/L)	CHROMIUM (ug/L)	MERCURY (ug/L)	CADMIUM (ug/L)	ARSENIC (ug/L)	BARIUM (ug/L)
MDNR	Sep-92	ND	ND	NS	NS	NS	NS	NS	NS
MDNR	Dec-94	5.1	ND	NS	NS	NS	NS	NS	NS
MDNR	Aug-95	ND	ND	NS	NS	NS	NS	NS	NS
MDNR	Nov-95	ND	ND	NS	NS	NS	NS	NS	NS
MODINE	Feb-96	ND	ND	NS	NS	NS	NS	NS	NS
MODINE	May-96	ND	ND	NS	NS	NS	NS	NS	NS
MDNR	Feb-99	2.5	ND	37.2	14.3	ND	ND	ND	91

MONITORING WELL MW-1

Sampled by:	Date	TCE (ug/L)	DCE (ug/L)	LEAD (ug/L)	CHROMIUM (ug/L)	MERCURY (ug/L)	CADMIUM (ug/L)	ARSENIC (ug/L)	BARIUM (ug/L)
MDNR	Sep-92	ND	ND	NS	NS	NS	NS	NS	NS
MDNR	Dec-94	6.9	ND	NS	NS	NS	NS	NS	NS
MDNR	Aug-95	11.8	ND	NS	NS	NS	NS	NS	NS
MDNR	Nov-95	9.4	ND	NS	NS	NS	NS	NS	NS
MODINE	Feb-96	ND	ND	NS	NS	NS	NS	NS	NS
MODINE	May-96	ND	ND	NS	NS	NS	NS	NS	NS
MODINE	Aug-96	ND	ND	NS	NS	NS	NS	NS	NS
MODINE	Dec-96	ND	ND	NS	NS	NS	NS	NS	NS
MDNR	Feb-99	10.1	ND	14.1	3.84	ND	ND	49.7	58.2

MONITORING WELL MW-3

Sampled by:	Date	TCE (ug/L)	DCE (ug/L)	LEAD (ug/L)	CHROMIUM (ug/L)	MERCURY (ug/L)	CADMIUM (ug/L)	ARSENIC (ug/L)	BARIUM (ug/L)
MDNR	Aug-95	8	ND	NS	NS	NS	NS	NS	NS
MDNR	Nov-95	ND	ND	NS	NS	NS	NS	NS	NS
MODINE	Feb-96	6.6	ND	NS	NS	NS	NS	NS	NS
MODINE	May-96	10	ND	NS	NS	NS	NS	NS	NS
MODINE	Feb-97	34	ND	NS	NS	NS	NS	NS	NS
MODINE	Mar-97	34	ND	NS	NS	NS	NS	NS	NS
MODINE	Jun-97	120	ND	NS	NS	NS	NS	NS	NS
MDNR	Feb-99	ND	ND	97.6	45.7	ND	2.26	6	151

MULBERRY WELL

Sampled by:	Date	TCE (ug/L)
MDNR	Feb-97	3.8
MDNR	Mar-97	3.8
MDNR	Jun-97	4.5
MDNR	Sep-97	4.3
MDNR	Dec-97	4.4
MDNR	Feb-98	6.3
MDNR	Mar-98	5.2
MDNR	Mar-98	3.6
MDNR	Apr-98	5.2
MDNR	May-98	4.1
MDNR	Jun-96	11.8
MDNR	Jun-98	5.1
MDNR	Aug-98	4.2
MDNR	Feb-99	5.3
MDNR	Mar-99	26.2

LEGEND:

- MONITORING WELL LOCATION (SHALLOW)
- MONITORING WELL LOCATION (DEEP)
- MUNICIPAL WELL LOCATION
- 960 10 FOOT ELEVATION CONTOUR
- TCE TRICHLOROETHYLENE
- DCE DICHLOROETHYLENE
- ug/L MICROGRAMS PER LITER
- NS NOT SAMPLED
- ND NOT DETECTED
- NA NOT AVAILABLE
- MDNR MISSOURI DEPARTMENT OF NATURAL RESOURCES
- MODINE MODINE MANUFACTURING

DESIGNED BY:	JGH
DRAWN BY:	WLG
APPROVED BY:	JGH
DATE:	10-13-03

SECOR

SUMMARY OF HISTORICAL
GROUND WATER ANALYTICAL RESULTS
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE 2.3

S:\PROJECTS\061.03 Projects\61UN.03001.00\cad files\RI Summary SEPT 03\061 figure 2.3\GW analytical.dwg wlg 07-11-03

appears that TCE concentrations above MCLs were first detected in the Mulberry well in February 1997.

Previous assessments and investigation associated with the former lagoon suggested that soil and groundwater constituents of concern include VOCs and RCRA metals. In particular, the following constituents of concern have been detected in the soils and groundwater associated with the former lagoon:

- Arsenic
- Chromium
- Lead
- TCE; and
- Cis-1,2- dicloroethene (DCE)

Facility Investigations

Modine is currently completing a RCRA Corrective Action at the Facility in accordance with a July 1999 Corrective Action Abatement Order on Consent issued by MDNR.

As part of their Corrective Action activities, Modine completed several investigations to identify the nature and extent of the contamination from chlorinated VOCs in subsurface soil at the Facility. Based on the results of these investigations, corrective actions were implemented as summarized below.

- In October and November 2001, excavation on the southwest portion of the Facility was performed of soil impacted with chrlorinated VOCs in excess of MDNR Cleanup Levels for Missouri (CALM) Soil Target Concentrations (STARC) Leaching to Groundwater (C_{LEACH}) LEVELS. Approximately 4,800 cubic yards of soil were excavated, segregated, and stockpiled. Of that volume, 3,000 cubic yards exceeded the STARC levels.

- Because the volume of impacted soil was significantly more than originally estimated, excavation activities ceased and a subsurface investigation was further implemented to better define the extent of impacted soil.
- Based on the investigation, alternative site-specific soil cleanup action levels were developed.
- In early march 2002, a total of 2,812 tons of impacted stockpile soil from the October/November, 2001 excavation, was disposed of as special waste.
- In May and June 2002, 4,614 tons of VOC impacted soil exceeding site-specific cleanup levels was excavated and transported to a landfill for disposal as a special waste and the site was restored (reference technical memorandums prepared by Modine's consultant, CH_2M Hill and submitted to MDNR's Permit Section).

SECTION 3.0 FIELD ACTIVITIES

INTRODUCTION

RI field activities were completed over three phases. Phase I activities consisted of the Former Hulett Lagoon soil investigation, monitoring well installation, groundwater sampling, aquifer testing, and natural attenuation evaluation. Phase II activities consisted of additional monitoring well installation, groundwater sampling, and aquifer testing. Phase III activities consisted of additional monitoring well installation, groundwater sampling, and aquifer testing. The three phases are discussed below.

PHASE I FIELD ACTIVITIES

The main tasks of the scope of work focused on characterization of near surface soils in the vicinity of the former lagoon, characterization of the distribution of groundwater contamination associated with the former lagoon, confirmation of the constituents of concern, evaluation of natural attenuation processes within the aquifer system, and evaluation of potential receptors (if appropriate). These tasks were detailed in the RI Work Plan approved by MDNR.

Phase I Former Hulett Lagoon Soils Assessment

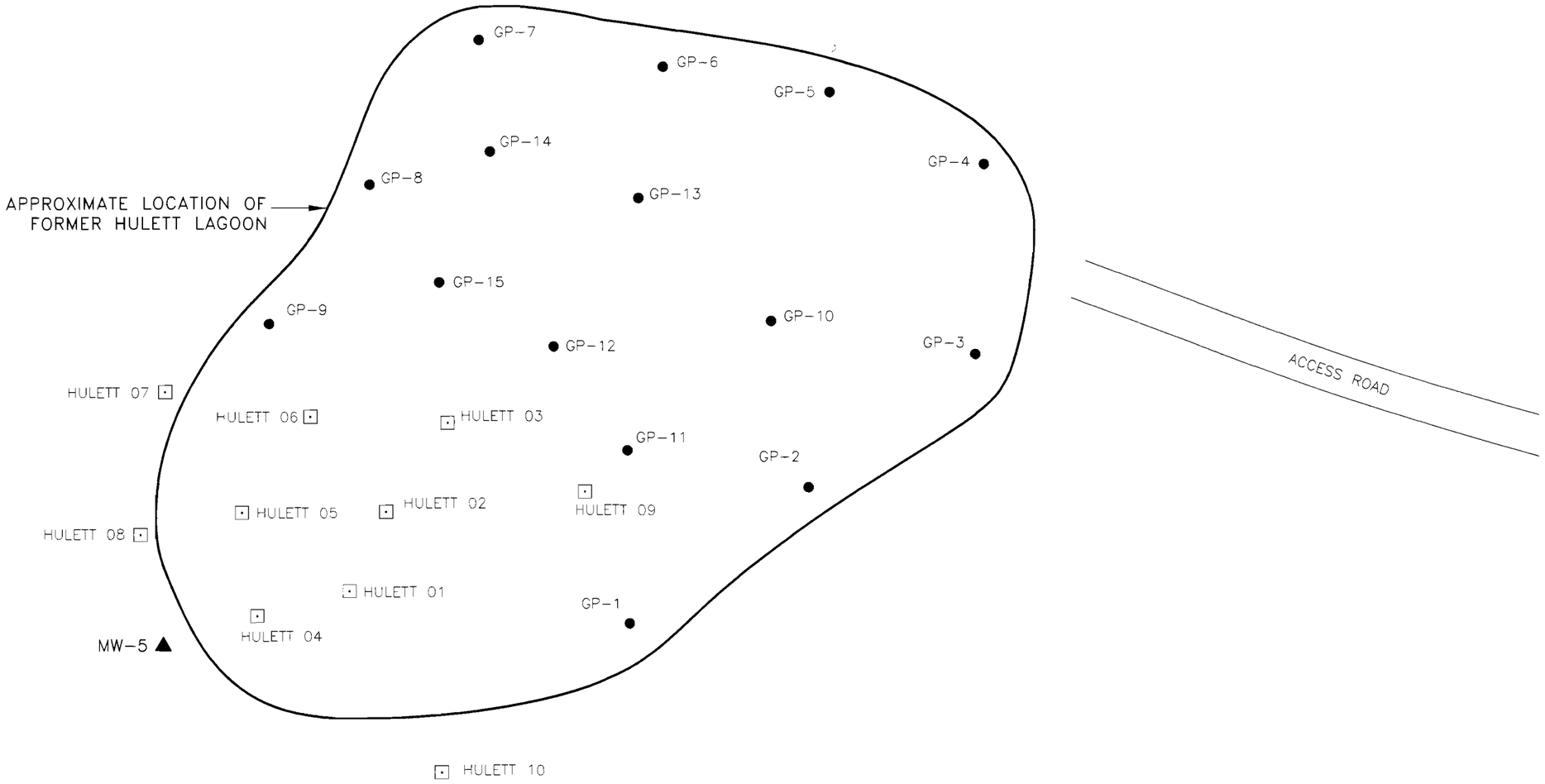
A total of 15 soil borings were advanced via Geoprobe™ coring methods (direct hydraulic push) within the footprint of the former lagoon during June 2000. All of the borings were located within previously uninvestigated portions of the former lagoon (central and eastern portions). All borings were advanced until meeting refusal within the upper (weathered) portion of the underlying dolomite bedrock. Boring depths ranged between 4 and 11 feet bgs.

Soil samples associated with each boring were retrieved continuously from land surface to the boring terminus (typically weathered bedrock) within 2-inch diameter, 4-foot long acetate liners. The retrieved undisturbed soil samples were field screened, immediately

upon opening of the liner, for the presence of VOCs using a photoionization detector (PID) calibrated to an isobutylene standard. The portions of each soil core exhibiting PID readings above background levels were segregated from the soil core. A portion of the segregated sample was placed in an individual resealable plastic bag, allowed to equilibrate at ambient temperatures for 10 minutes, and measured with the PID for headspace analysis. A portion of each segregated sample was also placed in appropriate laboratory-supplied sample containers and stored in an iced cooler under appropriate chain-of-custody procedures prior to shipment for laboratory analysis. A single sample from each boring exhibiting the highest PID headspace reading above background was selected for laboratory analysis. If the soil core did not exhibit readings above background levels, then the portion of the core at the residuum/bedrock interface was selected for laboratory analysis. The selected soil samples were analyzed on-site with a gas chromatograph (GC) using EPA method 3810 "Static Heated Headspace" for the presence of TCE. The purpose of this qualitative method was to aid decision-making for additional boring locations (if needed) to further characterize the extent of potential soil impacts on a "real-time" basis prior to awaiting the results of confirmatory analysis that could require remobilization. Confirmation samples were submitted to an analytical laboratory to be analyzed for the presence of VOCs and RCRA metals. Selected samples from intervals indicating the potential presence of contaminants (as determined through field screening and field GC analysis) were submitted to the analytical laboratory for analysis of VOCs per EPA Method 8260B and RCRA metals per EPA Method 6010B/7470A. In addition, four samples associated with the highest field screening results were submitted for TCLP extraction and VOCs and metals analysis.

Boring activities associated with the former lagoon soils assessment were performed by PSA Environmental of Lee's Summit, Missouri. Previously conducted boring locations performed by MDNR and the RI boring locations are depicted on Figure 3.1.

Sampling and analysis activities were conducted in accordance with the approved Field Sampling Plan (reference Remedial Investigation Work Plan dated May 26, 2000,



LEGEND:

- ▲ MONITORING WELL LOCATION
- ● SECOR SOIL BORING LOCATION, JUNE 2000
- ⊡ MDNR SOIL BORING LOCATION, JANUARY 1999

50 0 50
SCALE IN FEET

NORTH

DESIGNED BY:	MGD
DRAWN BY:	WLG
APPROVED BY:	MGD
DATE:	08-28-03

SECOR

HULETT LAGOON- SOIL BORING LOCATION MAP
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE 3.1

S:\PROJECTS\061.03 PROJECTS\61UN.03001.00\cad files\RI Summary SEPT 03\061 figure 3.1\soil borings.dwg wlg 08-28-03

Appendix A) and the approved Quality Assurance Project Plan (reference Remedial Investigation Work Plan dated May 26, 2000, Appendix B).

Phase I Monitoring Well Installation

A total of five groundwater monitoring wells were proposed to be installed in and around the former lagoon area to help characterize the occurrence and distribution of impacts that may be attributed to the former lagoon. MW-10 was to serve as a sentinel well and providing early warning should impacted groundwater migrate toward the City's Blair well. The rationale for monitoring well placement is presented in Table 3.1. Figure 2.2 presents the monitoring well locations.

To support the evaluation of groundwater contaminant occurrence and distribution associated with the former lagoon and adjacent areas, a total of five groundwater monitoring wells (MW-7 through MW-11) were installed as part of the Phase I RI activities. Monitoring wells MW-7, MW-8, MW-9 and MW-11 were advanced to, and completed within the first encountered groundwater interval. Completion depth intervals associated with these Phase I monitoring wells (excluding monitoring well MW-10) were similar to the completion depth interval of the Modine-installed monitoring well MW-5 (located adjacent to the former lagoon). Monitoring well MW-10 was advanced to and completed within a depth interval consistent with a portion of the City's Blair well production interval.

The Phase I monitoring wells were installed in accordance with MDNR Department of Geology and Land Survey (DGLS) regulations by Layne-Christensen Company (Layne) of Kansas City, KS (a licensed contractor in the State of Missouri) by utilizing a Barber truck-mounted air rotary drilling rig. All down-hole drilling equipment was steam-cleaned prior to initiation of drilling activities and between each monitoring well installation. All decontamination fluids were collected and retained within a decontamination pad constructed at the City's maintenance yard (yard) within a 1,000-gallon capacity tank pending results of characterization analyses. Development and

Table 3.1
Monitoring Well Locations
Phase I, II, and III
Hamilton Sundstrand Remedial Investigation
Camdenton, Missouri

Monitoring Well Number	Screen Interval	Location
Phase I		
MW-7	Within "perched zone"	Up gradient (topographically) and to the east of the former lagoon.
MW-8	Within "perched zone"	Located near the southeast corner of the former lagoon.
MW-9	Within "perched zone"	Located adjacent, at the southeast corner, of the Facility.
MW-10	Within the upper 20 feet of the "deep" aquifer	Located to the south of the former lagoon, and midway between the Facility and the Blair well.
MW-11	Within "perched zone"	Located to the west of the former lagoon and northwest of the Facility.
Phase II		
MW-12	Within "perched zone"	Located to the southwest of the former lagoon.
MW-13	Within "perched zone"	Located midway between the former lagoon and the Mulberry well.
MW-14	Within the upper 20 feet of the "deep" aquifer	Located midway between the former lagoon and the Mulberry well, paired with MW-13.
MW-15	Within "perched zone"	Located south of the former lagoon, and midway between the Mulberry well and the former lagoon (abandoned prior to Phase III activities).
Phase III		
MW-16	Within the "deep" aquifer	Located just northeast of the former lagoon.
MW-17	Within the "deep" aquifer	Located just northeast of the Mulberry well.
MW-18	Within the "deep" aquifer	Located northwest of the Facility, paired with MW-11.
MW-19	Within the "deep" aquifer	Located north of the Facility and northwest of the former lagoon.
MW-20	Within the "deep" aquifer	Located northwest of the Facility and northwest of the former lagoon.
MW-21	Within the "deep" aquifer	Located west of the Facility.
MW-22	Within the "deep" aquifer	Located northeast of the former lagoon.

Monitoring wells MW-1, MW-2, MW-3, and MW-4 were installed by Modine prior to RI activities.

purge waters associated with the RI were also retained in the decontamination fluid tank. Laboratory analysis confirmed the development and purge waters were non-hazardous, and they were disposed of at the City's POTW.

Borings advanced for monitoring wells MW-7, MW-8, and the initial boring associated with MW-10 utilized an 8 ¼-inch diameter borehole to accommodate the installation of a temporary 8-inch diameter steel surface casing. Temporary surface casings were installed to approximately 10 feet bgs to prevent caving of the near surface residuum materials during boring and well installation activities. Below the temporary surface casing, a 6 ½-inch diameter borehole was advanced to the borings terminus. The temporary casing was removed prior to completion of well construction. At monitoring well locations MW-9 and MW-11 no temporary surface casings were installed. At these locations a 6 ½-inch diameter borehole was utilized to advance the monitoring well borehole to terminus. Boring logs and well construction diagrams are presented in Appendix A.

All monitoring wells, with the exception of MW-10, were constructed of two-inch diameter, 30 foot long, #20 slot, schedule-80 PVC well screen connected to the ground surface by two-inch diameter, schedule-80 PVC well casing. The well screen extended from approximately 10 feet above the first encountered groundwater surface elevation to approximately 20 feet below that elevation. The borehole annulus, from boring terminus to approximately five feet above the top of the well screen, was backfilled with a clean, medium-grained (12/20 size) washed sand filter pack. An approximate three-foot thick layer of pelletized bentonite was placed atop the sand filter pack and hydrated as a well seal. The remainder of each boring annulus above the bentonite seal to approximately two feet bgs, was grouted with a bentonite slurry. Each monitoring well was completed as a flush-mount well equipped with traffic-grade well vaults set in concrete.

The original boring intended to accommodate the completion of monitoring well MW-10 was abandoned due to the technical requirements related to the unanticipated depth of

construction required to encounter groundwater. A second, larger-diameter boring was advanced approximately 5 feet northeast of the original boring. The original boring was abandoned in accordance with MDNR DGLS regulations

The boring advanced for monitoring well MW-10 utilized a 14-inch diameter borehole to accommodate the installation of approximately 40-feet of 10.5-inch diameter steel surface casing. This surface casing was permanently placed in the boring to facilitate the drilling and well installation activities. Beneath the surface casing a 10-inch diameter boring was advanced to its terminus. The screen interval associated with monitoring well MW-10 was targeted for the upper portion of the aquifer influenced by the Blair well. Groundwater at MW-10 was first encountered at a depth of 395 feet bgs (about 553 feet amsl) and the boring was advanced to a total depth of 465 feet bgs (about 483 feet amsl). MW-10 was constructed of 4-inch diameter, 60-foot long PVC well screen set from 455 feet bgs to 395 feet bgs (about 493 to about 553 feet amsl), and 4-inch diameter PVC well casing to land surface. Filter pack sand was placed in the annulus from boring terminus to approximately five feet above the top of the well screen. An approximately 45-foot thick bentonite slurry grout well seal was tremied above the sand filter pack. Following solidification, the remainder of the annulus was grouted with a bentonite slurry. A 3-inch diameter dedicated sampling pump was placed in MW-10 and connected to 1-inch diameter, Schedule-80 PVC rigid drop pipe. The well was completed at the surface with an electrical connection and discharge valve within a flush-mounted, traffic-grade well vault set in concrete.

Subsurface material classification was accomplished through the evaluation of drill cuttings delivered to the land surface, via the drilling rig's cyclone cutting containment unit, during boring advancement. Material classifications were performed at a minimum of 10 feet intervals. The classification included lithologic descriptions, changes in lithology, moisture content (including occurrence of saturated intervals) and field screening with a PID for the presence of VOCs. Boring logs are included in Appendix B and include the depth and identification of various strata, PID readings, and depth of encountered groundwater.

Investigation derived waste (IDW), including drill cuttings generated during monitoring well installation activities were containerized in either open top 55-gallon drums or lined roll-off boxes at each drilling location pending transfer to the City's yard following completion of each monitoring well installation. At the yard the drummed soils associated with individual monitoring well locations were transferred onto individual lined staging areas, covered with plastic, and labeled pending results of characterization analyses. Laboratory analyses confirmed IDW was not hazardous waste (reference Section 4.0).

All newly installed monitoring wells were surveyed with respect to a known geodetic datum point providing measuring point elevations (relative to mean sea level) and coordinates (relative to Missouri State Plane Coordinates) by Engineering Surveys and Services of Columbia, Missouri (a Missouri Licensed Surveyor).

Phase I Groundwater Monitoring Activities

Monitoring Wells

Groundwater samples were to be collected from monitoring wells MW-1, MW-2 (MDNR wells), MW-3, MW-4 (Modine Facility wells), MW-5 (Modine well at the former lagoon), MW-7, MW-8, MW-9, MW-10 and MW-11 in conjunction with contaminant distribution and aquifer response test activities.

Groundwater samples were collected from the groundwater monitoring wells within the monitoring network for analysis of VOCs and RCRA metals. Prior to sampling, the monitoring wells were purged using either a temporarily installed submersible pump combined with dedicated disposable Tygon tubing or dedicated disposable bailers, until stabilization of groundwater physical parameters (pH, conductivity, and temperature) had been achieved. Achievement of stabilization was determined when three consecutive well volumes (unless the wells purged dry, at which time they were allowed to

recharge to a sufficient amount to collect samples) exhibited physical parameters within the following tolerances: pH within 0.5 pH units, conductivity within 10%, and temperature within 0.5 degrees Celsius.

Samples for groundwater quality analysis were placed in the appropriate laboratory-supplied containers. Groundwater samples were labeled, stored on ice, and transported under appropriate chain-of-custody procedures to the analytical laboratory. Figure 2.2 shows monitoring well locations associated with Phase I.

Mulberry Well

During the groundwater extraction portion of the Aquifer Tests, extracted groundwater discharge samples were collected from the Mulberry well for analysis of VOCs to confirm compliance with NPDES discharge limits. The groundwater samples were collected directly from the sampling port located on the discharge assembly inside the Mulberry well pump house.

Samples for compliance analysis with NPDES discharge limits were placed in the appropriate laboratory-supplied containers. Groundwater samples were labeled, stored on ice and transported under appropriate chain-of-custody procedures to the analytical laboratory.

Groundwater Analytical Methodologies

Groundwater samples were collected before (pre-aquifer pump test period) and after (post-aquifer pump test period) aquifer response test events and analyzed for VOCs per EPA Method 8260B, RCRA metals per EPA Method 6010B and mercury per EPA Method 7470A/7471A.

Phase I Aquifer Response Tests

Phase I aquifer testing consisted of a pre-test monitoring period (Pre-Test) followed by a variable rate extraction step test (Step Test), a constant rate groundwater extraction test (Constant Rate Test) and aquifer recovery test (Post-Test). The Phase I Aquifer Test utilized the Mulberry well for extraction and monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, and MW-11 for groundwater elevation monitoring.

Pre-Test Period

To establish baseline conditions, groundwater elevations were collected prior to performance of the Step Test through the use of In-Situ professional series MiniTroll™ electronic transducers (data loggers) and manual water level measurements. The Pre-Test data collection allows for assessment of Pre-Test potentiometric surface trends and identification of external aquifer stress sources that may effect the results of the testing (i.e. pumping wells or conditions that may effect the results of the test such as barometric pressure, recharge events, etc.). The Pre-Test baseline data also serves as quality control data, allowing for comparison of Pre-Test, non-stress conditions and stressed aquifer responses.

Pre-Test monitoring was conducted at each monitoring well within the observation network: MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9 and MW-11. Refer to Figure 4.5 (Section 4.0) for the Phase I monitoring configuration. Pre-Test groundwater elevation data was collected at the monitoring wells beginning on June 27 at 1000 hours and continuing until the initiation of the Step Test on June 28 at 1400 hours. The groundwater elevation data collection interval for the data loggers for the Pre-Test period was 15 minutes.

Step Test Period

Prior to conducting the Step Test, data loggers were placed in monitoring wells of the Phase I monitoring network to obtain real time data of aquifer responses in the field. The data collected during the Step Test was used to establish appropriate well yields for use during the Constant Rate Test. Each step utilized a constant extraction rate over an approximately 6-hour period, with groundwater elevation data from the data loggers being collected at 15-second intervals from the monitoring well network throughout the testing period. During testing, transducer measurements were field verified at regular intervals using a manual water level indicator.

The Step Test was initiated on June 28, 2000 at 1400 hours, at an extraction rate of 545 gallons per minute (gpm). On June 28 at 2000 hours, the second step was initiated by increasing the extraction rate to 620 gpm. On June 29, at 0200 hours, the third step was initiated by increasing the extraction rate to 710 gpm. A fourth step was planned for 0800 hours; however, the maximum flow rate supported by the pump was achieved during the third step (710 gpm). This rate was maintained until the termination of the test at 1025 hours at which time extraction from the Mulberry well ceased. Upon completion of the Step Test, aquifer recovery was monitored for a period of approximately 12 days, during which time the aquifer recovered to static conditions.

Groundwater samples were collected from the Mulberry well at the start of the Step Test, prior to completion of each step and at the conclusion of the test. Groundwater samples were submitted to the analytical laboratory for analysis of VOCs per EPA Method 8260B.

Constant Rate Test Period

Following completion of the Step Test, the aquifer was allowed to recover to static conditions prior to initiating the Constant Rate Test. Based on results from the Step Test, the optimal well yield from the Mulberry well was targeted at a constant rate of about 685 gpm (actual time average was 681 gpm). The Mulberry well had historically been utilized as the City's primary water production well. During its operation, the Mulberry well operated at an extraction rate of approximately 500 gpm. As the goal of the Aquifer Tests were to mimic the long-term effects of groundwater production upon the aquifer system associated with the historic use of the Mulberry well, an extraction rate in excess of the long-term operational rate was required for each of the 72 hour Constant Rate Tests. Following evaluation of the Step Test data, an extraction rate of approximately 680 gpm was determined appropriate to maximize the historical influences during each of the 72 hour Constant Rate Aquifer Tests. Due to the variables of the extraction system (head changes and well efficiencies), small adjustments were required to maintain the flow rate during the test; however, the extraction rate flow variance during the test did not exceed 10%. The constant extraction flow rate was controlled with in-line valves and pump controls, and monitored with a flow meter. Prior to conducting the Constant Rate Test, data loggers were placed in monitoring wells of the Phase I monitoring network to obtain real time data of aquifer responses in the field. Groundwater elevation data from the data loggers was collected at 15-second intervals from the observation well network throughout the testing period. During testing, transducer measurements were field verified at regular intervals using a manual water level indicator.

The Constant Rate Test was initiated on July 11, 2000 at 1120 hours and was terminated on July 14, 2000 at 1120 (72-hour total duration) at which time extraction from the Mulberry well ceased.

Groundwater samples were collected from the Mulberry well at the start of the Constant Rate Test, every 24-hours during and at the conclusion of the test. Collected groundwater samples were submitted to the analytical laboratory from analysis of VOCs per EPA Method 8260B.

Post-Test Recovery Period

Post-Test groundwater elevation data collection from all monitoring points continued after the Constant Rate Test phase of testing until the aquifer system had recovered to approximately 30 to 100% of its Pre-Test elevations. Water level measurements were collected at 15-second intervals at each of the Phase I monitoring locations during the Post-Test Recovery Period. Due to very slow groundwater recovery in the monitoring wells completed in the "deep" aquifer, Post-Test recovery data was collected for five days, after which time recovery monitoring was discontinued and Post-Test groundwater sampling was initiated.

Natural Attenuation

The occurrence and relative effectiveness of natural attenuation within the aquifer system was evaluated during Phase I investigative activities through the collection and analyses of groundwater samples from select monitoring wells at the former lagoon and the facility. The evaluation incorporated both field screening and laboratory analytical methods to assess the presence or absence of either aerobic or anaerobic natural attenuation processes within the groundwater system beneath the former lagoon.

Field screening analyses included the in-situ measurements of oxidation/reduction potential (ORP) and dissolved oxygen (DO) from samples collected at each of the Phase I monitoring wells (with the exception of MW-1, MW-3, MW-9, and MW-10).

Laboratory analytical parameters included alkalinity, nitrate, sulfate, methane, ethane, ethene, select metals (consisting of iron, manganese, sodium, calcium, potassium, and magnesium), chloride, and total organic carbon (TOC). A total of five monitoring wells,

within the monitoring well network, were utilized to accommodate the collection of groundwater samples for laboratory analyses of the above referenced parameters. As outlined in the RI Work Plan, the selected monitoring wells included monitoring well MW-7 and MW-11 to provide data in areas outside assumed impacted areas, and monitoring wells MW-2, MW-4, and MW-5 to assess conditions within known areas of groundwater contamination.

PHASE II FIELD ACTIVITIES

Rationale

During completion of Phase I field activities, additional data gaps were identified. These data gaps included:

- The presence of a thin, perched groundwater zone ("perched zone"), located about 30 feet above the anticipated aquifer system;
- The inability to use MW-3 and MW-4 at the Facility as select monitoring points as both were completed at significantly greater depths than reported in technical data available for review during Work Plan development;
- The presence of chromium in a monitoring well (MW-11) well beyond the limits of perceived groundwater flow direction from the former lagoon; and
- The need to better understand aquifer characteristics and potential contaminant migration within the "deep" aquifer.

In an effort to eliminate these data gaps and to meet RI objectives, HS proposed additional activities including the following:

- The installation of additional "perched zone" and "deep" aquifer groundwater monitoring wells to aid in the characterization of groundwater

flow and potential contaminant migration directions associated with the former lagoon and immediately adjacent areas;

- The collection of additional groundwater samples from the monitoring well network for laboratory analyses to aid in the characterization of the extent and magnitude associated with the former lagoon and immediately adjacent areas;
- Laboratory analysis for the presence of hexavalent chromium in groundwater; and
- The performance of an additional 72-hour constant rate aquifer-pumping test utilizing the Mulberry well for extraction to aid in the characterization of the aquifer's response to groundwater extraction.

The additional activities were proposed to MDNR (reference letter dated November 6, 2000) and verbally approved by MDNR.

Phase II Monitoring Well Installation

A total of four additional groundwater monitoring wells were installed adjacent to the former lagoon as part of the Phase II investigation activities. The additional wells consisted of three "perched zone" wells and one "deep" aquifer well. Table 3.1 presents the rationale for monitoring well placements associated with Phase II (MW-12 through MW-15). Figure 4.5 shows the Phase II aquifer test configuration.

As a result of the discrepancies discovered during the Phase I activities, HS proposed, and MDNR approved, the installation of four additional monitoring wells. Monitoring wells MW-12, MW-13, and MW-15 were advanced to and completed within the "perched zone", and monitoring well MW-14 was advanced to and completed within the "deep" aquifer.

The Phase II monitoring wells were installed in accordance with MDNR DGLS regulations by Layne utilizing a truck-mounted air rotary drilling rig. All down-hole

drilling equipment was steam-cleaned prior to initiation of drilling activities and between each monitoring well installation. All decontamination fluids were collected and retained within a decontamination pad constructed at the City's yard within a 1,000-gallon capacity tank pending results of characterization analyses. Development and purge waters associated with the RI were also retained in the decontamination fluid tank. Laboratory analysis confirmed that development and purge waters were non-hazardous, and were disposed of at the City's POTW.

At all monitoring well locations, an initial 12-inch diameter boring was advanced to accommodate the installation of 10-inch diameter permanent and temporary steel casing. Temporary casings were installed at monitoring wells MW-12 and MW-15 to depths ranging from 10 and 20 feet bgs. At monitoring well locations MW-13 and MW-14, the steel surface casing was permanently cemented in place at depths also ranging from 10 to 20 feet bgs. At monitoring well location MW-12, a 7 7/8-inch diameter borehole was advanced from beneath the surface casing to the borings terminus. At monitoring well locations MW-13 and MW-14, a 9 7/8-inch borehole was advanced from beneath the surface casing to a depth of approximately 46 feet bgs (base of the clay residuum) from which depth a 7 7/8-inch boring was advance to each borings terminus. At monitoring well location MW-15, a 9 7/8-inch diameter borehole was advanced beneath the surface casing to accommodate the installation of an 8-inch diameter steel casing. Below this second steel casing, a 7 7/8-inch diameter borehole was advanced from beneath the surface casing to the boring terminus. Boring logs of these wells are included in Appendix B.

All Phase II monitoring wells were constructed with 2-inch diameter PVC casing and well screens in accordance with MDNR DGLS regulations and as previously described.

Subsurface materials associated with the Phase II monitoring wells were similar in composition and positioning as compared to the Phase I monitoring wells. However, it was noted that the cherty clay residuum exhibited its greatest thickness in the vicinity of MW-13, MW-14, and MW-15 (approximately 40 feet thick).

MW-12, MW-13, and MW-15 reached first encountered groundwater ("perched zone") at depths of about 140 feet bgs (about 818 feet amsl), 175 feet bgs (about 820 feet amsl), and 180 feet bgs (about 812 feet amsl), respectively. MW-14 encountered the apparent equivalent saturated zone being monitored by the monitoring wells installed at the Facility (MW-1, MW-2, MW-3 and MW-4; the "deep" aquifer zone) at a depth of about 224 feet bgs (about 772 feet amsl).

All decontamination activities were conducted as previously discussed. Drill cuttings from each of the Phase II monitoring wells were contained directly into roll-off containers supplied by a local waste hauler (Modern Sanitation) at each drilling location. Retained soils were transferred from the roll-offs into segregated staging areas at the City yard, pending results of characterization analyses. Laboratory analyses confirmed the drill cuttings (IDW) were not hazardous waste (reference Section 4.0).

Phase II Geophysical Well Logging

During Phase II activities, HS conducted geophysical investigative activities at select monitoring well locations. The data generated by HS' activities was provided to SECOR for review. The geophysical data has been incorporated into the Summary Report to further support RI findings.

During Phase II field activities, geophysical logging of select "perched zone" and "deep" aquifer monitoring wells (MW-7, MW-8 and MW-11; and MW-2, MW-3, MW-4 and MW-14, respectively) was performed to further refine subsurface stratigraphy in the vicinity of the former lagoon and Facility. The logging was performed by Century Geophysical Testing of Tulsa, Oklahoma, and utilized a combination of gamma ray, neutron, and resistivity techniques. Natural gamma ray, gamma-density, and neutron logging techniques were applied to all of the selected wells, with resistivity being applied only to MW-3, MW-4 and MW-14. A summary of geophysical techniques is discussed below.

Natural Gamma Ray Logging

Gamma rays are bursts of high-energy electromagnetic waves, which are emitted spontaneously by some radioactive nuclei. Radioactive potassium and nuclei on the uranium and thorium decay series emit nearly all gamma radiation encountered in the earth. The gamma ray tool contains a detector, which measures the natural radiation originating with the formation near the borehole. The short length of the detector provides good vertical resolution of bed thickness.

In sedimentary formations, the gamma ray curve normally reflects shale or clay content. This is because radioactive elements tend to be concentrated more in clay and shale than in clean sand or carbonates. The gamma ray tool can be run in cased holes. Specific applications suitable for natural gamma ray logging include subsurface correlation between wells, shale identification, and to pick bed boundaries and thickness, among others.

This tool provided the most useful information regarding the nature and correlation of bedrock formations in the vicinity of the former lagoon and the Facility.

Density Logging

The gamma-gamma density ("density") tool is a nuclear device consisting of a gamma ray source and one or two gamma ray detectors spaced at a certain interval(s) above the source. The number of gamma rays measured at each detector is directly related to the electron density of the formation, which in turn is directly related to the formation bulk density.

The bulk density of a formation is the ratio of its mass to volume. The tool is calibrated to read bulk density on the log readout and measurements are

recorded in units of grams per cubic centimeter. In low-density (high porosity) formations, most gamma rays from the source reach the detector and are counted. As the formation density increases (porosity decreases), fewer gamma rays reach the detector.

Formation density can be converted to porosity through a linear relationship between the density of the pure rock matrix and the density of the pore fluids weighted by their relative amounts. Density porosity logs display the result of this conversion in decimal units. The bulk porosity determined with this tool includes porosity that is ineffective (i.e., not interconnected and so fluid is held in small or isolated pores and is not producible). Thus, evaluations of effective porosity are best interpreted using a suite of logs where lithology can be confirmed.

Neutron Logging

The neutron tool is a nuclear device consisting of a neutron source and either one or two neutron or gamma ray detectors spaced at a certain interval(s) above the source. The number of neutrons or gamma rays measured at the detector(s) is directly related to the hydrogen ion content of the formation, which in most applications is a measure of water-saturated porosity. Since neutrons and gamma rays can readily penetrate PVC casing, neutron logging techniques can be used in wells cased with PVC.

High porosity (high concentration of hydrogen) means fewer neutrons reach the detector to be counted. Low porosity (low concentration of hydrogen) will result in more neutrons or gamma rays reaching the detector(s) to be counted. Most neutron tools are calibrated to convert this count rate or the ratio of the two count rates to porosity assuming a certain type of rock matrix usually limestone. Shale and zones containing a significant amount of clay will indicate high neutron porosity due to water associated with the shale or clay. Thus, neutron logs are

typically compared with others, such as density and natural gamma ray, to determine bedrock lithology.

Resistivity Logging

The contact resistivity tool is an electrical device consisting of a combination of current and measuring electrodes. Electrical current is introduced into the formation and the resistance to flow caused by the bedrock formation is measured. This tool is most notably used to evaluate the nature of formation fluids and for high-resolution bed boundary definition.

Successful resistivity logging requires direct contact between the tool and the borehole and a fluid filled borehole. As such it was performed only in Modine wells MW-3 and MW-4, which are uncased below approximately 64 feet and 43 feet bgs respectively, and in MW-14 prior to casing installation. However, resistivity logging in these wells yielded little useful information because the saturated thickness was small relative to the depth of these wells.

Phase II Groundwater Monitoring Activities

Monitoring Wells

Groundwater samples were collected from monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, MW-11, MW-12, MW-13, MW-14 and MW-15 during the pre- and post-aquifer pumping test periods.

During each of the Phase II sampling events (i.e., the pre- and post-aquifer pumping test periods), the collected samples were analyzed for VOCs and RCRA metals. In addition, monitoring wells that had exhibited total chromium concentrations above the laboratory analytical detection limits during the Phase I

investigation activities were analyzed for the speciation of hexavalent chromium during the Phase II pre-aquifer pumping test sampling event. Chromium speciation data would be used to help determine if elevated levels of chromium (as well as other metals) in soil and groundwater were more attributable to natural background conditions, rather than past disposal activities at the former lagoon or other potential sources.

Mulberry Well

During the groundwater extraction portion of the Aquifer Tests, extracted groundwater discharge samples were collected from the Mulberry well for analysis of VOCs to confirm compliance with NPDES discharge limits. The groundwater samples were collected directly from the sampling port located on the discharge assembly inside the Mulberry well pump house.

Samples for compliance analysis with NPDES discharge limits were placed in the appropriate laboratory-supplied containers. Groundwater samples were labeled, stored on ice and transported under appropriate chain-of-custody procedures to the analytical laboratory.

Groundwater Analytical Methodologies

Groundwater samples were collected before (pre-aquifer pump test period) and after (post-aquifer pump test period) aquifer response test events and analyzed for VOCs per EPA Method 8260B, RCRA metals per EPA Method 6010B/7470A and hexavalent chromium per EPA Method 7196A.

Phase II Aquifer Response Tests

Pre-Test Period

Baseline groundwater elevations were collected prior to performance of the Constant Rate Test through the use of groundwater elevation data obtained from data loggers and manual water level measurements to establish baseline conditions. The Pre-Test data collection allow for assessment of Pre-Test potentiometric surface trends and identification of external aquifer stress sources that may effect the results of the testing (i.e. pumping wells or conditions that may effect the results of the test such as barometric pressure, recharge events etc.). The Pre-Test baseline data also serves as quality control data, allowing for comparison of Pre-Test non-stress conditions and stressed aquifer responses. Pre-Test monitoring was conducted at each well of the observation network: MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, MW-11, MW-12, MW-13, MW-14, and MW-15. Phase II monitoring well locations are shown in Figures 2.2 and 4.5. Pre-Test groundwater elevation data was collected at the observation wells beginning on November 27 at 1645 hours and continuing until the initiation of the Constant Rate Test on November 29 at 1358 hours. The groundwater elevation data collection interval for the Pre-Test period was 15 minutes.

Constant Rate Test Period

Following collection of the Pre-Test data, the Constant Rate Test was performed. Prior to conducting the Constant Rate Test, data loggers were placed in observation wells of the Phase II monitoring network to obtain real time data of aquifer responses in the field. Groundwater elevation data from the data loggers was collected at 15-second intervals from the observation well network throughout the testing period. During testing, data logger measurements were field verified at regular intervals using a manual water level indicator.

Data gathered during the Phase I Step and Constant Rate Tests were used to establish the Phase II constant extraction rate. Based on results from the Phase I tests, the optimal well yield from the Mulberry well was targeted at a constant rate of approximately 665 gpm (actual time average was 662 gpm). The constant extraction flow rate was controlled during the test with in-line valves and pump controls, and monitored with flow meters. The extraction rate flow variance during the test did not exceed 10%.

The Constant Rate Test was initiated on November 29, 2000 at 1358 hours and was terminated on December 2, 2000 at 1358 hours (72-hour total duration).

Groundwater samples were collected from the Mulberry well at the start of the Constant Rate Test, every 24-hours during the test, and at the conclusion of the test. Collected groundwater samples were submitted to the analytical laboratory for analysis of VOCs per EPA Method 8260B.

Post-Test Recovery Period

Post-Test groundwater elevation data collection from all monitoring points continued after each phase of testing until the aquifer system had recovered to static conditions (approximately 100% of its Pre-Test levels). Water level measurements were collected at 15-second intervals at each of the Phase II observation locations during the Post-Test period. Post-Test recovery data was collected for 16 days, during which time the aquifer recovered to static conditions at each of the observation wells.

PHASE III FIELD ACTIVITIES

Rationale

During completion of Phase II field activities, additional data gaps were identified, including:

- The extent of contamination within the "deep" aquifer (specifically, the delineation of the contaminant plume downgradient of the former lagoon); and
- The hydraulic affects of the Mulberry well on these downgradient data gaps.

Phase I and II findings were summarized in a RI report submitted to MDNR (reference Summary Report Remedial Investigation – Former Hulett Lagoon dated April 2001). Following MDNR's review, HS met with several MDNR representatives in June 2001 to discuss Phase I and II findings, the aforementioned data gaps, and potential courses of action to practically characterize the extent of "deep" aquifer impacts.

MDNR was represented by staff from the Cooperative Program/Superfund section, Permit Section (RCRA), and DGLS. Additionally, staff from the Missouri Department of Public Health was present. As a result of that meeting, there was general consensus on the following:

- The extent of impacts in the "perched zone" (based on groundwater flow direction) could be defined as the potentiometric surface "daylighted" in the ravine south of the Facility and Mulberry well.
- Operation of the Mulberry well did have a significant affect on the regional hydrology, and was likely providing hydraulic containment of impacted groundwater in the "deep" aquifer.
- Natural attenuation was likely not a viable remedial alternative.
- Metals (in particular chromium) were not constituents of concern.

- MW-3 and MW-4's construction details (open boreholes completed through the "perched zone" and "deep" aquifer) were potential exposure pathways and should be eliminated (both were decommissioned by Modine in 2002).
- The extent of contamination in the "deep" aquifer and the hydraulic affects of continued use of the Mulberry well needed to be further characterized.

As a result of this meeting (and subsequent informal discussions with MDNR), HS submitted to MDNR a Phase II RI/FS Work Plan (reference Work Plan dated April 1, 2002). MDNR approved the Work Plan in May 2002.

Phase III activities focused on defining the extent of contamination in the "deep" aquifer and the benefit of the continued use of the Mulberry well to hydraulically contain groundwater impacted with VOCs. Phase III activities included the initial installation of two new monitoring wells and the performance of additional aquifer testing. Analytical results from one of the newly installed Phase III wells indicated elevated concentrations of TCE. Based on these analytical results, it was determined that the installation of two additional monitoring wells would be required to further help define the extent of "deep" aquifer impacts. These additional two wells are discussed in detail later in Section 3.0 (Subsequent Phase III Activities). Due to site access issues, MW-15 was abandoned prior to Phase III activities. MW-15 was abandoned in accordance with MDNR DGLS regulations.

Phase III Monitoring Well Installation

SECOR installed two monitoring wells immediately north and southeast of the former lagoon (MW-16 and MW-17, respectively). Both wells were completed within the "deep" aquifer in accordance with the RI Work Plan (reference Work Plan dated May, 2000).

The Phase III monitoring wells were installed in accordance with MDNR Division of Geological Survey and Resource Assessment (GSRAD) (formerly known as DGLS) regulations by Layne utilizing a truck-mounted air rotary drilling rig. All down-hole drilling equipment was steam-cleaned prior to initiation of drilling activities and between

each monitoring well installation. All decontamination fluids were collected and retained within a decontamination pad constructed at the City's yard within a 1,000-gallon capacity tank pending results of characterization analyses. Development and purge waters associated with the RI were also retained in the decontamination fluid tank. Laboratory analysis confirmed that development and purge waters were non-hazardous, and were disposed of at the City's POTW.

At both monitoring well locations, an initial 10-inch diameter boring was advanced to accommodate the installation of an 8-inch diameter permanent and temporary steel casing. At monitoring well locations MW-16 and MW-17, the steel surface casing was permanently cemented in place at depths of 17.5 feet in MW-16, and 60 feet in MW-17 (5 feet below the base of the clay residuum). After the surface pipe was cemented in place, a 7 7/8-inch boring was advanced to each borings terminus. MW-16 was advanced to a total depth of 230.5 feet, and MW-17 was advanced to a total depth of 280 feet.

No split-spoon samples or cores were collected. Subsurface samples were manually classified by the field geologist. The classifications occurred a minimum of every 5 feet of boring advancement. Logs of the borings indicating the depth and identification of the various strata, rate of advancement, water elevation information, and pertinent information regarding the method of maintaining and advancing the drill hole were made. Boring logs for MW-16 and MW-17 (and well construction diagrams) are included in Appendix A.

The Phase III monitoring wells were constructed with 2-inch diameter schedule-80 PVC casing and well screens in accordance with MDNR GSRAD regulations and as previously described.

All decontamination wastes were containerized and retained at a secure location pending results of characterization analysis (VOC's by USEPA Method 8260B). The drill cuttings were determined to be non-hazardous and disposed of as fill at the City yard.

Phase III Groundwater Monitoring Activities

Monitoring Wells

Groundwater samples were collected from the groundwater monitoring wells within the monitoring network for analysis of VOCs. Prior to sampling, the monitoring wells were purged using either a temporarily installed submersible pump combined with dedicated disposable Tygon tubing or dedicated disposable bailers, until stabilization of groundwater physical parameters (pH, conductivity, and temperature) had been achieved. Achievement of stabilization was determined when three consecutive well volumes (unless the wells purged dry, at which time they were allowed to recharge to a sufficient amount to collect samples) exhibited physical parameters within the following tolerances: pH within 0.5 pH units, conductivity within 10 %, and temperature within 0.5 degrees Celsius.

Samples for groundwater quality analysis were placed in the appropriate laboratory-supplied containers. Groundwater samples were labeled, stored on ice, and transported under appropriate chain-of-custody procedures to the analytical laboratory.

Mulberry Well

The Mulberry well was utilized as the extraction well for each of the Aquifer Tests. The Mulberry well was not operated during the Pre-Test and Post-Test periods of the Aquifer Tests.

During the groundwater extraction portion of the Aquifer Tests, extracted groundwater discharge samples were collected from the Mulberry well for analysis of VOCs to confirm compliance with NPDES discharge limits. The

groundwater samples were collected directly from the sampling port located on the discharge assembly inside the Mulberry well pump house.

Samples for compliance analysis with NPDES discharge limits were placed in the appropriate laboratory-supplied containers. Groundwater samples were labeled, stored on ice and transported under appropriate chain-of-custody procedures to the analytical laboratory.

Phase III Groundwater Analytical Methodologies

Groundwater samples were collected before (pre-aquifer pump test period) and after (post-aquifer pump test period) aquifer response test events and analyzed for VOCs per EPA Method 8260B.

Phase III Aquifer Response Tests

Aquifer testing was conducted in August 2002 to monitor the affect of the Mulberry well on the "deep" aquifer. Testing activities included a step-test (Variable Rate Test) and a Constant Rate Test. Both tests were conducted in accordance with the RI Work Plan. Groundwater elevations were monitored in monitoring wells screened in the "deep" aquifer during the pre-test, test, and post-test (recovery) portions of the aquifer testing. Groundwater levels were collected through the use of hand held water level indicators and data loggers located in the wells screened in the "deep" aquifer.

Pre-Test Period

Baseline groundwater elevations were collected prior to performance of the Constant Rate Test through the use of groundwater elevation data obtained from data loggers and manual water level measurements to establish baseline conditions. The Pre-Test data collection allow for assessment of Pre-Test potentiometric surface trends and identification of external aquifer stress sources

that may effect the results of the testing (i.e. pumping wells or conditions that may effect the results of the test such as barometric pressure, recharge events etc.). The Pre-Test baseline data also serves as quality control data, allowing for comparison of Pre-Test non-stress conditions and stressed aquifer responses. Pre-Test monitoring was conducted at each well of the observation network: MW-1, MW-2, MW-14, MW-16 and MW-17. Refer to Figure 4.5 for the Phase III monitoring configuration. Pre-Test groundwater elevation data was collected at the observation wells beginning on July 25, 2002 at 0527 hours and continuing until the initiation of the Constant Rate Test on August 6, 2002 at 1358 hours. The groundwater elevation data collection interval for the Pre-Test period was 15 minutes.

Variable Rate Test Period

Prior to conducting the Variable Rate Test, data loggers were placed in monitoring wells of the Phase III monitoring network to obtain real time data of aquifer responses in the field. The data collected during the Variable Rate Test was used to establish appropriate well yields for use during the Constant Rate Test. Each step utilized a constant extraction rate over an approximately 8-hour period, with groundwater elevation data from the data loggers being collected at 15-second intervals from the monitoring well network throughout the testing period. During testing, transducer measurements were field verified at regular intervals using a manual water level indicator.

The Variable Rate Test was initiated on August 6, 2002 at 0845 hours, at an extraction rate of 333 gpm. On August 6 at 1654 hours, the second step was initiated by increasing the extraction rate to 570 gpm. On August 7, at 0014 hours, the third step was initiated by increasing the extraction rate to 710 gpm. This rate could not be sustained and quickly stabilized to 680 gpm. This rate was maintained until the termination of the test on August 7 at 0900 hours at which time extraction from the Mulberry well ceased. Upon completion of the Test,

aquifer recovery was monitored for a period of approximately 14 days, during which time the aquifer recovered to static conditions.

Groundwater samples were collected from the Mulberry well at the start of the Test, prior to completion of each step and at the conclusion of the test. Groundwater samples were submitted to the analytical laboratory for analysis of VOCs per EPA Method 8260B.

Constant Rate Test Period

Following collection of Pre-Test data, the Constant Rate Test was performed. Prior to conducting the Constant Rate Test, data loggers were placed in observation wells of the Phase III monitoring network to obtain real time data of aquifer responses in the field. Groundwater elevation data from the data loggers was collected at 15-second intervals from the observation well network throughout the testing period. During testing, data logger measurements were field verified at regular intervals using a manual water level indicator.

Data gathered during the Phase I, Phase II and Phase III Step and Phase I and Phase II Constant Rate Tests were used to establish the Phase III constant extraction rate. Based on results from the previous tests, the optimal well yield from the Mulberry well was targeted at a constant rate of approximately 670 gpm The constant extraction flow rate was controlled during the test with in-line valves and pump controls, and monitored with flow meters. The extraction rate flow variance during the test did not exceed 10%.

The Constant Rate Test was initiated on August 20, 2002 at 0915 hours and was terminated on August 23, 2002 at 0900 hours (72-hour total duration).

Groundwater samples were collected from the Mulberry well at the start of the Constant Rate Test, every 24-hours during the test, and at the conclusion of the

test. Collected groundwater samples were submitted to the analytical laboratory for analysis of VOCs per EPA Method 8260B.

Post-Test Recovery Period

Post-Test groundwater elevation data collection from all monitoring points continued after each phase of testing until the aquifer system had recovered to static conditions (approximately 100% of its Pre-Test levels). Water level measurements were collected at 15-minute intervals at each of the Phase III observation locations during the Post-Test period. Post-Test recovery data was collected for 12 days, during which time the aquifer recovered to near static conditions at each of the observation wells.

SUBSEQUENT PHASE III ACTIVITIES

Rationale

Initial Phase III findings identified a continuing data gap regarding the extent of contamination in the "deep" aquifer. MW-16 (located immediately north of the former lagoon) was not anticipated to be impacted. Elevated levels of TCE and DCE required HS to further step out to delineate groundwater impacts. Phase III findings and proposed Subsequent Phase III Activities were highlighted in a technical report submitted to MDNR (reference Phase III Remedial Investigation Findings dated March 28, 2003).

The Subsequent Phase III activities continued to focus on determining the extent of VOC contamination in the "deep" aquifer and in collecting data which could be used to determine if the Mulberry well could be used to provide hydraulic containment for the "deep" aquifer. Activities performed to meet these objectives included the installation of five monitoring wells to determine the northern and western extent of VOC contamination in the "deep" aquifer, sampling and analysis of groundwater for select analytes and parameters, and performance of two 48-hour constant rate aquifer

response tests. A field study of the outcrops in the ravines near the Facility was conducted to evaluate the potential relationship between the major erosional features in the area and fracture orientations.

Monitoring Well Installation (December 2002)

Due to concentrations of TCE and DCE detected in MW-16 in December of 2002 and January of 2003, HS installed two new monitoring wells to help define the limits of contamination. MW-18 was installed west from the former lagoon, and MW-19 was installed northwest from the former lagoon.

The additional monitoring wells were installed in accordance with MDNR GSRAD regulations by Layne by utilizing a truck-mounted air rotary drilling rig. All down-hole drilling equipment was steam-cleaned prior to initiation of drilling activities and between each monitoring well installation. All decontamination fluids were collected and retained within a decontamination pad constructed at the City's yard within a 1,000-gallon capacity tank pending results of characterization analyses. Development and purge waters associated with the RI were also retained in the decontamination fluid tank. Laboratory analysis confirmed that development and purge waters were non-hazardous, and they were disposed of at the City's POTW.

At the monitoring well locations, an initial 10-inch diameter boring was advanced to accommodate the installation of an 8-inch diameter permanent steel casing. At monitoring well locations MW-18 and MW-19, the steel surface casing was permanently cemented in place at depths of 39 feet in MW-18, 26 feet in MW-19 (5 feet below the base of the clay residuum). After the surface pipe was cemented in place, a 7 7/8-inch boring was advanced to each borings terminus. MW-18 was advanced to a total depth of 205 feet, MW-19 was advanced to a total depth of 235 feet.

No split-spoon samples or cores were collected. Subsurface samples were manually classified by the field geologist. The classifications occurred a minimum of every 5 feet

of boring advancement. Logs of the borings indicating the depth and identification of the various strata, rate of advancement, water elevation information, and pertinent information regarding the method of maintaining and advancing the drill hole were made. Boring logs for MW-18 and MW-19 (and well construction diagrams) are available for review and are included in Appendix A.

The monitoring wells were constructed with 2-inch diameter PVC casing and well screens in accordance with MDNR GSRAD regulations and as previously described.

All decontamination wastes were containerized and retained at a secure location pending results of characterization analysis (VOC's by USEPA Method 8260B). The drill cuttings were determined to be non-hazardous and disposed of as fill at the City yard.

Aquifer Response Test (January 2003)

After the installation of MW-18 and MW-19 a 48-hour constant rate pump test was conducted on January 20-23, 2003, in order to determine the influence of pumping the Mulberry well on those wells. The pump rate during the 48-hour constant rate test was approximately 600 gpm. Groundwater elevations were monitored during pre-test, test, and post test (recovery) portions of the aquifer testing. Groundwater levels were collected using data loggers located in the wells screened in the "deep" aquifer.

Pre-Test Period

Baseline groundwater elevations were collected prior to performance of the Constant Rate Test through the use of groundwater elevation data obtained from data loggers and manual water level measurements to establish baseline conditions. The Pre-Test data collection allow for assessment of Pre-Test potentiometric surface trends and identification of external aquifer stress sources that may effect the results of the testing (i.e. pumping wells or conditions that may effect the results of the test such as barometric pressure, recharge events

etc.). The Pre-Test baseline data also serves as quality control data, allowing for comparison of Pre-Test non-stress conditions and stressed aquifer responses. Pre-Test monitoring was conducted at each well of the observation network: MW-1, MW-2, MW-14, MW-16, MW-17, MW-18 and MW-19. Refer to Figure 2.2 for the Phase III (January 2003 48-hour constant rate) monitoring configuration. Pre-Test groundwater elevation data was collected at the observation wells beginning on January 17, 2003 at 0215 hours and continuing until the initiation of the Constant Rate Test on January 20, 2002 at 0900 hours. The groundwater elevation data collection interval for the Pre-Test period was 15 minutes.

Constant Rate Test Period

Following collection of the Pre-Test data, the Constant Rate Test was performed. Prior to conducting the Constant Rate Test, data loggers were placed in observation wells of the Phase III monitoring network to obtain real time data of aquifer responses in the field. Groundwater elevation data from the data loggers was collected at 15-second intervals from the observation well network throughout the testing period. During testing, data logger measurements were field verified at the beginning and end of the constant rate test using a manual water level indicator.

Mulberry well was set at a constant rate of approximately 600 gpm. The constant extraction flow rate was controlled during the test with in-line valves and pump controls, and monitored with flow meters.

The Constant Rate Test was initiated on January 20, 2003 at 0900 hours and was terminated on January 23, 2003 at 0900 hours (48-hour total duration).

Post-Test Recovery Period

Post-Test groundwater elevation data collection from all monitoring points continued after each phase of testing until the aquifer system had recovered to near static water levels. Water level measurements were collected at 15-minute intervals at each of the Phase III observation locations during the Post-Test period. Post-Test recovery data was collected for 7 days, during which time the aquifer recovered to near static conditions at each of the observation wells.

Fracture Orientation

During March 2003, observations of fracture orientations were made in the ravines near the Facility and former lagoon in order to determine if there was a correlation between the major fracture orientations and erosional features. Obvious fractures in the outcrops were counted and the fracture orientations were recorded and compared to erosional features (e.g. ravines, gullies, etc.) depicted on topographic maps of the area.

Subsequent Geophysical Well Logging

Prior to the installation of MW-20, MW-21, and MW-22, geophysical well data was collected from MW-16, MW-18 and MW-19 in the form of gamma ray and neutron logging in order to identify the presence and depth interval of the low permeability zone (these data were used to determine total depths and screen interval of the proposed wells in order to screen the wells in the "deep" aquifer). The geophysical logging was useful due to the difficulty in distinguishing the boundaries of the zone through drill cuttings alone. Geophysical well logging was also conducted on MW-20, MW-21, and MW-22 after their completion to better understand the structure of the low permeability zone in the area of investigation. In addition MW-14 was also logged for correlation purposes. Gamma ray and neutron logging were conducted on the wells by Century Geophysical Corporation using the same methodologies that were described in the Phase II activities.

Monitoring Well Installation (June 2003)

Monitoring wells MW-20, MW-21, and MW-22 were installed to help determine the northern and western limits of VOC contamination and to help determine the extent of influence during pumping of the Mulberry well.

The additional monitoring wells were installed in accordance with MDNR GSRAD regulations by Layne utilizing a truck-mounted air rotary drilling rig. All down-hole drilling equipment was steam-cleaned prior to initiation of drilling activities and between each monitoring well installation. All decontamination fluids were collected and retained within a decontamination pad constructed at the City's yard within a 1,000-gallon capacity tank pending results of characterization analyses. Development and purge waters associated with the RI were also retained in the decontamination fluid tank. Laboratory analysis confirmed that development and purge waters were non-hazardous, and they were disposed of at the City's POTW.

At the monitoring well locations, an initial 10-inch diameter boring was advanced to accommodate the installation of an 8-inch diameter permanent steel casing. At monitoring well locations MW-20, MW-21 and MW-22, the steel service casing was permanently cemented in place at depths of 41 feet bgs in MW-20, 30 feet bgs in MW-21 and 50 feet bgs in MW-22 (5 feet below the base of the clay residuum). After the service pipe was cemented in place, a 7 7/8-inch boring was advanced to each borings terminus. MW-20 was advanced to a total depth of 345 feet, MW-21 was advanced to a total depth of 215 feet and MW-22 was advanced to a total depth of 310 feet.

No split-spoon samples or cores were collected. Subsurface samples were manually classified by the field geologist. The classifications occurred a minimum of every 5 feet of boring advancement. Logs of the borings indicating the depth and identification of the various strata, rate of advancement, water elevation information, and pertinent information regarding the method of maintaining and advancing the drill hole were

made. Boring logs for MW-20, MW-21 and MW-22 (and well construction diagrams) are included in Appendix A.

The monitoring wells were constructed with 2-inch diameter schedule-80 PVC casing and well screens in accordance with MDNR GSRAD regulations and as previously described.

All decontamination wastes were containerized and retained at a secure location pending results of characterization analysis (VOC's by USEPA Method 8260B). The drill cuttings were determined to be non-hazardous and disposed of as fill at the City yard.

Groundwater Monitoring Activities (June 2003)

Monitoring Wells

Groundwater samples were collected from the groundwater monitoring wells within the monitoring network for analysis of VOCs. Wells sampled included MW-1, MW-2, MW-5, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, and MW-22. Prior to sampling, the monitoring wells were purged using either a temporarily installed submersible pump combined with dedicated disposable Tygon tubing or dedicated disposable bailers, until stabilization of groundwater physical parameters (pH, conductivity, and temperature) had been achieved. Achievement of stabilization was determined when three consecutive well volumes (unless the wells purged dry, at which time they were allowed to recharge to a sufficient amount to collect samples) exhibited physical parameters within the following tolerances: pH within 0.5 pH units, conductivity within 10 %, and temperature within 0.5 degrees Celsius.

Samples for groundwater quality analysis were placed in the appropriate laboratory-supplied containers. Groundwater samples were labeled, stored on

ice, and transported under appropriate chain-of-custody procedures to the analytical laboratory.

Mulberry Well

The Mulberry well was utilized as the extraction well for each of the Aquifer Tests. The Mulberry well was not operated during the Pre-Test and Post-Test periods of the Aquifer Tests. The Mulberry well discharge was not sampled during the July 2003, 48-hour constant rate test.

Groundwater Analytical Methodologies

Groundwater samples were collected before the aquifer response test event and analyzed for VOCs per EPA Method 8260B.

Aquifer Response Test (July-August 2003)

After the installation of MW-20, MW-21 and MW-22, and sampling of the monitoring well network, a 48-hour constant rate pump test was conducted in order to determine the influence of the Mulberry well on those wells. Groundwater elevations were monitored during pre-test, test, and post-test (recovery) portions of the aquifer testing. Groundwater levels were collected using data loggers located in the wells screened in the "deep" aquifer.

Pre-Test Period

Baseline groundwater elevations were collected prior to performance of the Constant Rate Test through the use of groundwater elevation data obtained from data loggers and manual water level measurements to establish baseline conditions. The Pre-Test data collection allow for assessment of Pre-Test potentiometric surface trends and identification of external aquifer stress sources

that may effect the results of the testing (i.e. pumping wells or conditions that may effect the results of the test such as barometric pressure, recharge events etc.). The Pre-Test baseline data also serves as quality control data, allowing for comparison of Pre-Test non-stress conditions and stressed aquifer responses. Pre-Test monitoring was conducted at each well of the observation network: MW-1, MW-2, MW-14, MW-16, MW-17, MW-20, MW-21, and MW-22. Refer to Figure 4.5 for the Phase III monitoring configuration. Pre-Test groundwater elevation data was collected at the observation wells beginning on July 23, 2003 at 1800 hours and continuing until the initiation of the Constant Rate Test on July 30, 2003 at 0855 hours. The groundwater elevation data collection interval for the Pre-Test period was 15 minutes.

Constant Rate Test Period

Following collection of the Pre-Test data, the Constant Rate Test was performed. Prior to conducting the Constant Rate Test, data loggers were placed in observation wells of the Phase III monitoring network to obtain real time data of aquifer responses in the field. Groundwater elevation data from the data loggers was collected at 15-minute intervals from the observation well network throughout the testing period. During testing, data logger measurements were field verified at regular intervals using a manual water level indicator.

Data gathered during the previous RI aquifer tests were used to establish the July 2003 48-hour constant extraction rate. Based on results from the previous tests, the optimal well yield from the Mulberry well was targeted at a constant rate of approximately 600 gpm. The constant extraction flow rate was controlled during the test with in-line valves and pump controls, and monitored with flow meters. The extraction rate flow variance during the test did not exceed 10%.

SECTION 4.0
FINDINGS

LAGOON SOILS ASSESSMENT

Former Hulett Lagoon Soils

Soil materials encountered at each boring exhibited similar composition, generally consisting of brown-red to brown-gray cherty clay above weathered dolomite bedrock. The clay typically contained abundant organics near the ground surface and had occasional gray mottling and traces of sand throughout each soil core. The percentage of chert varied between each location and the clays were generally moist. Depth to refusal (bedrock) ranged from 4.5 feet bgs in GP-8 to 11.5 feet bgs in GP-14. Soil Boring logs are included in Appendix A. Each boring was abandoned following sample collection with bentonite.

Soils Analytical Results

The only borings exhibiting PID readings above background concentrations were GP-6 and GP-9. The only laboratory detection of TCE and DCE was from boring GP-9, which reported a concentration of 3,100 ug/Kg and 650 ug/Kg respectively (reference Figure 4.1 and Table 4.1). TCLP analysis reported no VOCs above detection limits and minor concentrations of barium (GP-12A, 5'-6', 2.4 ppm; GP-6A, 4'-5', 1.8 ppm, GP-9A, 7'-8', 2.6 ppm; and GP-10A, 7'-8', 2.3 ppm). The presence of barium is most likely attributed to natural background conditions. A summary of the analytical data from the soil borings is shown in Figure 4.1 and Table 4.1. Boring logs are included in Appendix A.

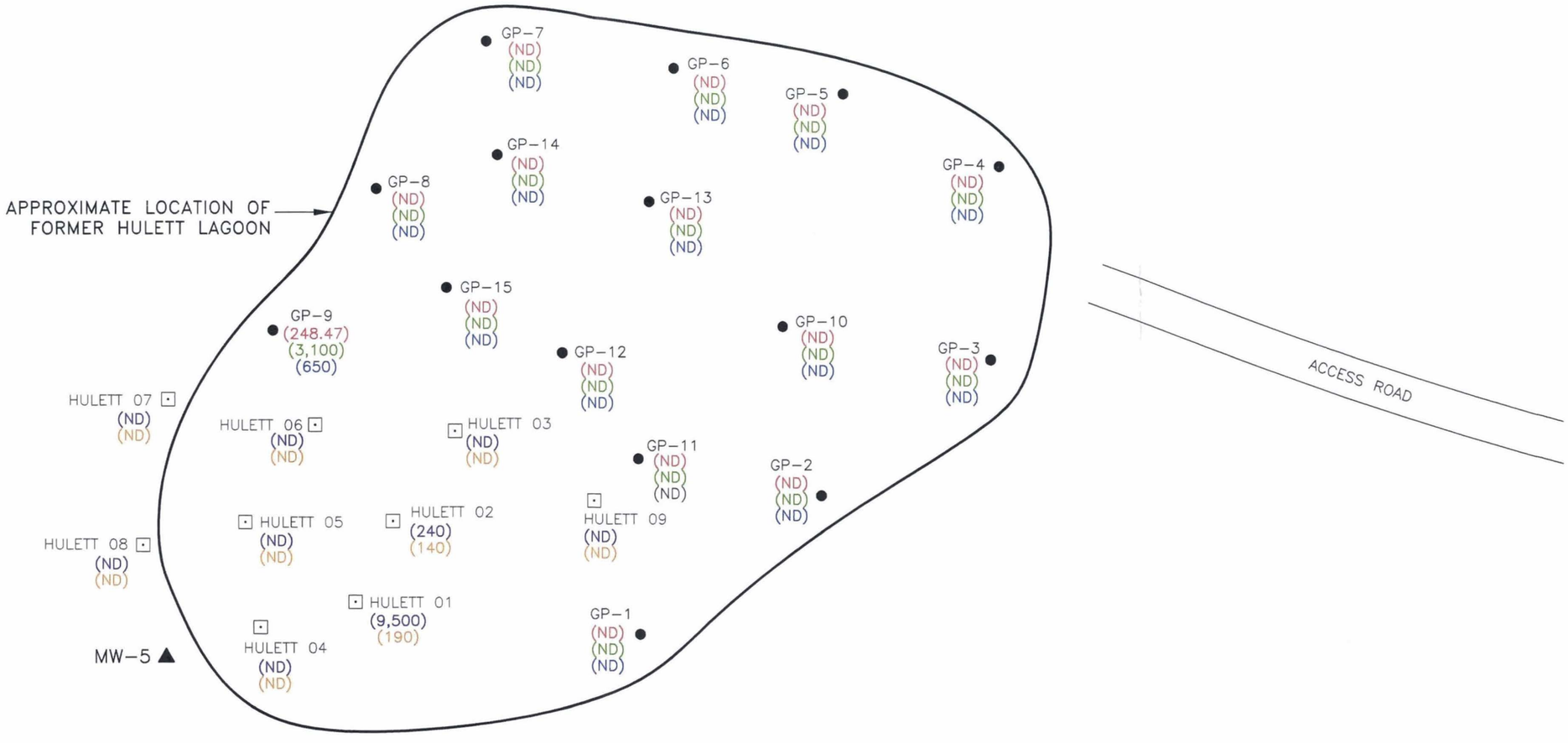
Table 4.1
Detected Analytes- Hulett Lagoon Soils
Hamilton Sundstrand Remedial Investigation
Camdenton, Missouri

ANALYTE	UNITS	SOIL SAMPLES – MOBILE LABORATORY														
		GP-1 9.5'– 10'	GP-2 8.5'– 9'	GP-3 6'– 7'	GP-4 8'– 9'	GP-5 7'– 8'	GP-6 4'– 5'	GP-7 6'– 7'	GP-8 3'– 4'	GP-9 7'– 8'	GP-10 6.5'– 7.5'	GP-11 8'– 9'	GP-12 5'- 6'	GP-13 6'– 7'	GP-14 10'– 11'	GP-15 5.5'– 6.5'
Trichloroethene	ug/Kg	ND	ND	ND	ND	ND	ND	ND	ND	248.47	ND	ND	ND	ND	ND	ND

ug/Kg – micrograms/Kilogram (ppb)
Analysis by EPA Method 3810 "Static Heated Headspace"
ND – Analyte not detected within reporting limits of the test
10' – 11' – Approximate sample depths in feet below ground surface

ANALYTE	UNITS	SOIL SAMPLES – FIXED LABORATORY														
		GP-1 9.5'– 10'	GP-2 8.5'– 9'	GP-3 6'– 7'	GP-4 8'– 9'	GP-5 7'– 8'	GP-6 4'– 5'	GP-7 6'– 7'	GP-8 3'– 4'	GP-9 7'– 8'	GP-10 6.5'– 7.5'	GP-11 8'– 9'	GP-12 5'- 6'	GP-13 6'– 7'	GP-14 10'– 11'	GP-15 5.5'– 6.5'
Trichloroethene	ug/Kg	ND	ND	ND	ND(1)	ND(1)	ND(1)(2)	ND	ND(1)	3,100(1)(3)	ND(1)(2)	ND(1)	ND(1)	ND(1)(2)	ND(1)(2)	ND(1)(2)
CIS 1,2 – Dichloroethene (Total)	ug/Kg	ND	ND	ND	ND	ND	ND	ND	ND	650(3)	ND	ND	ND	ND	ND	ND
Mercury	ug/Kg	0.3	0.15	0.068	0.035	0.071	0.061	0.061	0.2	0.11	ND	0.097	ND	ND	0.089	ND
Arsenic	ug/Kg	9.6	2	9.2	3.5	9	1.8	5.8	7.5	10.3	2.6	9.3	11	3.7	6.6	6
Lead	ug/Kg	36.5	6.8	79.5	49.6	98.8	24.4	21.5	19.3	91.4	36.6	47.2	43	25.6	73.3	30.3
Barium	ug/Kg	93.7	27.9	113	26.3	81	168	39.5	119	258	3.4	67.2	172	51.8	59.9	27.9
Cadmium	ug/Kg	ND	0.66	2.4	0.48	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	ug/Kg	30.4	2	9.2	4.3	11.8	8.8	16.6	23.2	34.4	3.6	18.8	20.4	7.8	12.8	22.4

(1) Methylene Chloride detected above reporting limits – suspected laboratory artifact
(2) Acetone detected above reporting limits – suspected laboratory artifact
(3) Laboratory calibration range exceeded
Analysis by USEPA Method 8260B(VOCs) and Method 7470A/7471A/6010B (Metals)
ND – Analyte not detected within reporting limits of the test
10' – 11' – Approximate sample depths in feet below ground surface



LEGEND:

- ▲ MONITORING WELL LOCATION
- ● SECOR SOIL BORING LOCATION, JUNE 2000
- ⊡ MDNR SOIL BORING LOCATION, JANUARY 1999
- (248.47) TCE CONCENTRATIONS IN ug/L, MOBILE LAB– SECOR
- (3,100) TCE CONCENTRATIONS IN ug/kg, FIXED BASE LABORATORY– SECOR
- (650) DCE CONCENTRATIONS IN ug/kg, FIXED BASE LABORATORY– SECOR
- (9,500) TCE CONCENTRATIONS IN ug/kg– MDNR
- (190) DCE CONCENTRATIONS IN ug/kg– MDNR
- (ND)= NOT DETECTED

NOTE:
THIS DRAWING WAS PRODUCED IN COLOR.
ANY REPRODUCTION OF THIS MAP, NOT IN TRUE COLOR, WILL RESULT IN THE LOSS OF INFORMATION.

50 0 50
SCALE IN FEET

NORTH

DESIGNED BY:	MGD
DRAWN BY:	WLG
APPROVED BY:	MGD
DATE:	08-28-03

SECOR

SOIL ANALYTICAL RESULTS– FORMER LAGOON AREA
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE 4.1

S:\PROJECTS\061.03 PROJECTS\61UN.03001.00\cad files\RI Summary SEPT 03\061 figure 3.1\soil results.dwg wlg 08-28-03

GEOPHYSICAL WELL DATA

Results of these analyses (in conjunction with boring log data) indicated that subsurface materials consist of a combination of unconsolidated sediments and consolidated bedrock. The unconsolidated sediments are comprised predominantly of clay with inclusions chert and weathered bedrock (predominantly dolomite) fragments. These unconsolidated materials extend to depths between 10 and 60 feet bgs (MW-8 and MW-14, respectively). These depth variations are a result predominantly due to undulating surface topography. The bedrock is comprised primarily of dolomite with interbedded zones of chert.

Geophysical and boring log data associated with "deep" aquifer monitoring wells indicate the presence of an interval of increased clay content (argillaceous interval) at depths between 160 feet and 300 feet bgs. Although the depths below land surface vary (attributable to surface topography), the presence of the argillaceous interval appears to be consistent across the investigation area (with the base of the interval occurring between approximately 690 and 790 feet amsl) and dips to the west at about 2%. Review of the "deep" aquifer monitoring well geophysical logs indicates a zone of increased gamma ray response approximately 30 to 40 foot thick, interpreted to be a stratigraphic interval that is more argillaceous than the units above and below. The argillaceous interval is relatively consistent with some variation in its depth below land surface due to changes in surface topography (and its westerly dip). Its consistency throughout this area was further demonstrated by the lack of response noted in "perched zone" monitoring wells versus the response noted in "deep" aquifer monitoring wells during Aquifer Test activities using the Mulberry well. Geophysical logs associated with the "deep" aquifer monitoring wells are included in Appendix D.

The absence of an observable increased gamma ray response interval associated with the "perched zone" monitoring wells indicates that these wells were completed above (or within the upper portion) of the top of the argillaceous interval. This assessment is supported in a review of data associated with the "perched zone" and "deep" aquifer

nested well pair, MW-13 and MW-14. At this nested pair, the base of increased gamma ray response interval was not observed in the "perched zone" well, yet the "deep" aquifer well exhibits both the top and bottom of the argillaceous zone (approximately 40 feet thick). Geophysical logs associated with the "perched zone" monitoring wells are presented in Appendix D. The presence of this increased gamma response zone appears to coincide with an apparent low permeabilty zone which results in a barrier that inhibits the vertical migration of fluids (water and contamination) through the bedrock interval to the underlying "deep" aquifer. A low permeability barrier would explain the difference in aquifer response to pump tests between wells screened above the low permeability barrier and those screened below it. This barrier to vertical migration is attributed to reduced permeabilities (both primary and secondary) inherent to the rock matrix in comparison to the overlying and underlying dolomite units. As a result of this permeability difference, fluids accumulate atop, and within, the upper portion the argillaceous zone, creating a "perched" zone system. Eventually, fluids associated with the "perched" zone system may migrate through the low permeabilty zone to the underlying bedrock units and the associated "deep" aquifer.

A comparison of well completion intervals with respect to the top and bottom elevations of the low permeability zone confirms that monitoring wells MW-5, MW-7, MW-8, MW-9, MW-11, MW-12, MW-13, and MW-15 (abandoned) are completed above or extend into the upper portion of the low permeability zone (typically less than 10 feet). These wells comprise what is referred to as the "perched zone" monitoring well network. This comparison also indicates that monitoring wells MW-1, MW-2, MW-14, MW-16, MW-18, MW-19, MW-20, MW-21, and MW-22 are screened completed entirely beneath or within a portion of the lower 10 feet of the low permeability zone. Data associated with monitoring wells MW-3 (abandoned) and MW-4 (abandoned) indicate that these wells had completion intervals spanning the entire thickness of the low permeability zone, incorporating both the "perched zone" and "deep" aquifers (refer to geophysical logs in Appendix D).

FORMER HULETT LAGOON GEOLOGY

In general, the former lagoon stratigraphy consists of unconsolidated surficial sediments underlain by dolomite to the maximum investigated depth of approximately 742 feet amsl. It should be noted that surficial soils above the first encountered bedrock may have been disturbed during lagoon closure from excavation/grading activities. Based upon a geologic map of the area, the first encountered bedrock unit in the vicinity of the former lagoon consists of dolomite of the Ordivician-Age Roubidoux Formation.

The uppermost unit underlying the former lagoon primarily consists of recent disintegration residuum of the upper bedrock units. Based upon a review of the former lagoon boring logs, this unit appears to be continuous across the RI area and varies in thickness from 10 feet at MW-8 to approximately 55 feet in the vicinity of monitoring well MW-17. The first encountered sediments are gravel/silt or asphalt/gravel near-surface fill material assemblage. The near-surface fill materials are underlain by red-brown cherty clay of the bedrock disintegration residuum. The sediments of the bedrock disintegration zone consist primarily of silt and clay with varying amounts of chert and sand. These sediments are presumably the product of weathering of the underlying dolomite. The residuum exhibits a white/light blue-gray to yellow/tan or tan mottling. The unconsolidated disintegration residuum contains small fragments of the underlying bedrock and grades downward into a weathered dolomite zone.

Underlying the surficial deposits are dolomite, sandy dolomite, and clay-rich dolomite comprised of the Roubidoux or Gasconade Dolomite Formations. The dolomite is described as consisting of sandy, clayey, and cherty dolomite. Dolomite is present to the maximum investigated depth of approximately 742 feet amsl. The dolomitic bedock is occasionally soft and friable in the upper zone and grades into a presumably less permeable zone that hydrologically isolates the "perched zone" from the underlying "deep" aquifer.

Analysis of the drill cuttings from MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, and MW-22 in comparison to the geophysical logs show a general correlation between the lithology and log response. The lithology above the interval of increased gamma ray response consists primarily of tan dolomite, chert and occasional chalky white dolomite. The lithology in the interval with the increased gamma ray response tends to be composed primarily of brown low permeability dolomite and chert. The strata below the interval with increased gamma ray response tends to be primarily gray, vuggy, sucrosic dolomite and chert. The gray dolomite is usually accompanied by increased water content during drilling, in comparison to the overlying lithology, and is associated with the "deep" aquifer.

Figure 4.2 is a contour map of the base of the interval of increased gamma response. The interval appears to have a general westerly dip. An area of increased elevation change occurs locally between wells MW-4 (abandoned) and MW-14, and wells MW-16 and MW-18.

Fracture Orientation

Observations of fracture orientations at numerous bedrock outcrop locations along the ravines near the Facility and former lagoon indicated a primary fracture set orientation of approximately N 50^0 E and a secondary fracture set orientation of approximately N 35° W. During previous site investigations (conducted primarily by Modine), a predominate N 50^0 E trending fracture set was also identified. When these fracture orientations are compared with major erosional features within the site topographic area, there are similar orientations between some of the major ravines and the primary and secondary fracture orientations. Figure 4.3 is a map showing the major erosional features with fracture orientations overlaid. Appendix E is a summary of the frequency of fracture orientations observed in the outcrops.

The general groundwater flow direction tends to correspond with the primary fracture orientation. The area near the former lagoon appears to locally correspond with the secondary fracture set orientation.

ENTON TOWERSITE
ANAGEMENT AREA

Radio Tower

Lookout Tower

313

300

240

270

210

283

198

22

27

26

25

MW-20

MW-21

MW-19

MW-22

MW-16

MW-5

MW-8

MW-7

MW-13

MW-11

MW-18

MW-12

MW-14

MW-2

MW-9

MW-1

MW-10

Community Park

Camdenton

MULBERRY MUNICIPAL WELL

Cem

Sew Disp Ponds

297

301

307

292

318

HAHATONKA

CAMDEN AVE

WT

CH

ST

LEGEND:

N 50° E — PRIMARY FRACTURE ORIENTION FROM DAMES & MOORE, 1998 & SECOR INT. INC. 2003

N 35° W — SECONDARY FRACTURE ORIENTION FROM SECOR INT. INC. 2003

NORTH – SOUTH EROSIONAL FEATURES

EAST – WEST EROSIONAL FEATURES

AQUITARD BREACH

0 1000 2000

SCALE IN FEET

NORTH

REFERENCE: USGS 7.5 MINUTE QUADRANGLE: GREEN BAY TERRACE, MO 1983
USGS 7.5 MINUTE QUADRANGLE: CAMDENTON, MO 1983

DESIGNED BY:	MGD
DRAWN BY:	GLH
APPROVED BY:	MGD
DATE:	09-05-03

SECOR

SITE AREA TOPOGRAPHIC MAP SHOWING FRACTURE ORIENTATION IN RELATION TO MAJOR EROSIONAL FEAT

FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE

S:\PROJECTS\061.03 Projects\61UN.03001.00\cad files\RI Summary SEPT 03\061 usgs figures\figure 4.3.dwg wlg 07-11-03

MW-20
693
MW-21
742
MW-19
741
MW-22
693
MW-16
MW-5
MW-8
MW-7
MW-11
MW-18
758
MW-13
MW-12
MW-14
MW-4
MW-2
MW-9
MW-1
MW-3
MW-15
MW-17
785
MW-10
Sew Disp Ponds
Community Park
Camdenton
MULBERRY MUNICIPAL WELL
HAHATONKA
CAMDEN
CH
WT
Cem
292
313
307
270
240
300
755
795
800
283
22
23
24
25
26

LEGEND:

MW-18 ▲ DEEP WELL

MW-12 △ SHALLOW WELL

MW-3 ⊕ ABANDON MONITORING WELL

△ 693 MONITORING WELL LOCATION WITH A GAMMA-RAY LOG SHOWING THE BASE OF THE ELEVATED GAMMA ZONE. THE BASE OF THE ELEVATED GAMMA ZONE IS DISPLAYED IN FEET ABOVE MEAN SEA LEVEL.

—705— CONTOUR OF BASE OF THE ELEVATED GAMMA ZONE.

0 700 1400

SCALE IN FEET

NORTH

REFERENCE: USGS 7.5 MINUTE QUADRANGLE: GREEN BAY TERRACE, MO 1983
USGS 7.5 MINUTE QUADRANGLE: CAMDENTON, MO 1983

DESIGNED BY:	MGD
DRAWN BY:	GLH
APPROVED BY:	MGD
DATE:	09-09-03

SECOR

SITE AREA TOPOGRAPHIC MAP SHOWING THE STRU OF THE BASE OF THE LOW PERMEABILITY ZON
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGU

S:\PROJECTS\061.03 Projects\61UN.03001.00\cad files\RI Summary SEPT 03\061 usgs figures\figure 4.2.dwg wlg 07-11-03

GROUNDWATER ANALYTICAL RESULTS

Groundwater samples have been collected from the monitoring well network during the three RI phases. As mentioned in Section 3.0, Phase I groundwater samples were analyzed for VOCs and RCRA metals using EPA Method 8260B and 6010B, respectively. Phase II groundwater samples were analyzed for the same analytical parameters including hexavalent chrome by EPA Method 7196A. After evaluating Phase I and II analytical data, it was determined (with concurrence from MDNR) that RCRA metals no longer needed to be analyzed. As such, Phase III groundwater samples were analyzed for VOCs using EPA Method 8260B. Laboratory Analytical Reports are included in Volume II of the RI Summary Report.

Phase I Monitoring Well Analytical Results

Groundwater samples were collected prior to Aquifer Testing activities from monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, M2-8, M2-9, and MW-11 in July 2000 and submitted to the analytical laboratory for analysis of VOCs per EPA Method 8260B and RCRA metals per EPA Method 6010B and Method 7470A/7471A.

Results of these analyses indicated the presence of VOCs in monitoring wells MW-4, MW-5, and MW-8. The detected VOCs consist of TCE and DCE. TCE detections ranged between 79 ppb and 1,000 ppb (MW-4 and MW-8, respectively), DCE detections ranged between 7 ppb and 53 ppb (MW-4 and MW-8, respectively.

Results of these analyses also indicted the presence of lead, barium, cadmium, and chromium within portions of the "perched zone" and "deep" aquifer systems. Lead was detected in all monitoring wells with the exception of MW-4. Lead concentrations ranged between 3.5 ppb and 56.1 ppb (MW-8 and MW-7, respectively). Barium was detected in all samples collected. Barium concentrations ranged between 63.2 and 124 ppb (MW-1 and MW-9, respectively). Cadmium was detected only in MW-5 at a concentration of 3.8 ppb. Chromium was detected in monitoring wells MW-3, MW-5,

MW-7, MW-8, MW-9, and MW-11. Chromium concentrations ranged between 6.9 ppb and 34.1 ppb (MW-8 and MW-11, respectively).

Groundwater samples were also collected after Aquifer Testing Activities from monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, MW-10, and MW-11 in July 2000 and submitted to the analytical laboratory for analysis of VOCs per EPA Method 8260B and RCRA metals for EPA Method 6010B and Method 7470A/7471A.

Results of these analyses indicate the presence of VOCs in monitoring wells MW-4, MW-5, and MW-8. The detected VOCs consisted of TCE and DCE. TCE detections ranged between 42 ppb and 1,500 ppb (MW-4 and MW-8, respectively). DCE detections ranged between 8 ppb and 31 ppb (MW-5 and MW-8, respectively).

Results of these analyses also indicated the presence of lead, barium, and chromium within portions of the "perched zone" and "deep" aquifer system. Lead was detected in all monitoring wells with the exception of MW-10 and MW-11. Lead detections ranged between 3.7 ppb and 19.4 ppb (MW-5 and MW-3, respectively). Barium was detected in all monitoring wells. Barium concentrations ranged between 52.3 ppb and 116 ppb (MW-5 and MW-9, respectively). Chromium was detected in monitoring wells MW-3, MW-4, MW-8 and MW-9. Detected concentrations ranged between 5.8 ppb and 41.1 ppb (MW-9 and MW-3, respectively).

A summary of Phase I analytical results is presented in Table 4.2.

Phase II Monitoring Well Analytical Results

Groundwater samples were collected prior to Aquifer Testing activities from monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, and MW-15 in November 2000 and submitted to the analytical laboratory for analysis of VOCs per EPA Method 8260B and RCRA metals for EPA Method 6010B and Method 7470A/7471A, and hexavalent chromium per EPA Method 7196A.

TABLE 4.2
Detected Analytes - Groundwater
Phase I Pre-Aquifer Test
Remedial Investigation
Hamilton Sundstrand
Camdenton, Missouri

ANALYTE	UNITS	GROUNDWATER SAMPLES									MCL
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-7	MW-8	MW-9	MW-11	
Acetone[1]	ug/L	ND	ND	ND	ND	ND	ND	ND	14	ND	no MCL
Methylene Chloride[1]	ug/L	7	7	7	7	5 [2]	6	40	24	6	no MCL
1,2 Dichloroethene	ug/L	ND	ND	ND	7	25 [2]	ND	53	ND	ND	100 ug/L
Trichloroethene	ug/L	ND	ND	ND	79	450[2]	ND	1,000	4 [2]	3 [2]	5.0 ug/L
Barium	ug/L	63.1	102	78.4	75.4	70.8	60.3	95.2	124	110	2000 ug/L
Lead	ug/L	19	13.2	6.2	ND	29.8	56.1	3.5	5.4	14.1	15 ug/L [3]
Chromium	ug/L	ND	ND	14.4	ND	18.0	8.4	6.9	20.1	34.1	100 ug/L
Cadmium	ug/L	ND	ND	ND	ND	3.8	ND	ND	ND	ND	5 ug/L

(1) Suspected Laboratory Artifact
(2) Laboratory Estimate
(3) No MCL (action level at tap)
ug/L - micrograms / Liter (ppb)
VOCs by EPA Method 8260B
RCRA Metals by EPA Method 6010B
ND - Analyte not detected within reporting limits of the test
MCL - Maximum Contaminant Level from USEPA Drinking Water Regulations
Shaded areas - Reported levels above MCL (or above action level for lead)

TABLE 4.2 (cont'd)
Detected Analytes - Groundwater
Phase I Post-Aquifer Test
Remedial Investigation
Hamilton Sundstrand
Camdenton, Missouri

ANALYTE	UNITS	GROUNDWATER SAMPLES									MCL
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-7	MW-8	MW-9	MW-11	
1,2 Dichloroethene	ug/L	ND	ND	ND	ND	8 (1)	ND	31 (1)	ND	ND	100 ug/L
Trichloroethene	ug/L	ND	ND	ND	42	270 (1)	ND	1500 (1)	ND	ND	5 ug/L
Barium	ug/L	59.6	100	84.4	79.2	52.3	58	99.2	116	76.6	2000 ug/L
Lead	ug/L	12.1	18.6	19.4	4.9	3.7	9.7	5.8	12.1	ND	15 ug/L (2)
Chromium	ug/L	ND	ND	41.1	19	ND	ND	10.4	5.8	ND	100 ug/L

(1) Laboratory Estimate
(2) No MCL (action level at tap)
ug/L - micrograms / Liter (ppb)
VOCs by EPA Method 8260B
RCRA Metals by EPA Method 6010B
ND - Analyte not detected within reporting limits of the test
MCL - Maximum Contaminant Level from USEPA Drinking Water Regulations
Lead - no MCL (action level at tap)
Shaded areas - Reported levels above MCL (or above action level for lead)

Results of these analyses indicated the presence of VOCs in monitoring wells MW-3, MW-4, MW-5, MW-8, MW-12, MW-13, and MW-14. Detected VOCs consist of TCE, DCE, and toluene. TCE concentrations ranged between 5 ppb and 1,000 ppb (MW-4 and MW-12, respectively). DCE concentrations ranged between 8 ppb and 310 ppb (MW-5 and MW-8, respectively). Toluene concentrations occurred in monitoring well MW-3 and MW-4 at 8 ppb and 4 ppb, respectively. Results of these analyses also indicated the presence of lead, barium, cadmium and total chromium within portions of the "perched zone" and "deep" aquifer system. Lead was detected in all monitoring wells with the exception of MW-10. Lead detections ranged between 6.8 ppb and 62.5 ppb (MW-9 and M-15, respectively). Barium was detected in all monitoring wells. Barium concentrations ranged between 49.5 ppb and 162 ppb (MW-10 and MW-14, respectively). Cadmium was detected in monitoring well MW-4 at a concentration of 3.2 ppb. Chromium was detected in monitoring wells MW-2, MW-5, MW-7, MW-9, MW-10, and MW-12. Chromium concentrations ranged between 7.5 ppb and 67 ppb (MW-11 and MW-15, respectively). No hexavalent chromium was detected in any of the monitoring wells. The presence of metals above detection limits is believed to be attributable to natural background levels.

Groundwater samples were collected after Aquifer Testing activities from monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, and MW-15 in December 2000 and January 2001 and submitted to the analytical laboratory for analysis of VOCs per EPA Method 8260B and RCRA metals for EPA Method 6010B and Method 7470A/7471A, and hexavalent chromium per EPA Method 7196A.

Results of these analyses indicated the presence of VOCs in monitoring wells MW-4, MW-5, MW-8, MW-12, MW-13, MW-14, and MW-15. Detected VOCs consist of TCE and DCE. TCE detections range between 8 ppb and 780ppb (MW-14 and MW-12, respectively). DCE detections ranged between 9 ppb and 54 ppb (MW-5 and MW-12, respectively).

Results of these analyses also indicated the presence of lead, barium, total chromium, and arsenic. Lead was detected in all monitoring wells with the exception of MW-4 and MW-10. Detected concentrations ranged between 3.8 ppb and 190 ppb (both MW-1 and MW-5; and M-15, respectively). Barium was detected in all monitoring wells. Barium concentrations ranged between 54.9 ppb and 192 ppb (MW-7 and MW-14, respectively). Total chromium was detected in monitoring wells MW-1, MW-4, and MW-10. Detected concentrations ranged between 7.6 ppb and 152 ppb (MW-5 and MW-14, respectively). Arsenic was detected in monitoring well MW-15 at a concentration of 13.5 ppb. Hexavalent chromium was not detected in any of the monitoring wells. The presence of metals above detection limits is believed to be attributable to natural background levels.

A summary of Phase II analytical results is presented in Table 4.3.

Phase III Monitoring Well Analytical Results

Monitoring wells MW-5, MW-7, MW-8, MW-9, MW-11, MW-12, and MW-13 are screened in the "perched" zone. The TCE detections for the "perched" aquifer wells from the sampling event which took place in June, 2003 ranged from 1,100 ppb to190 ppb (MW-12 and MW-13, respectively). The detections of DCE ranged from 60 ppb to 8.5 ppb (MW-12 and MW-13, respectively). Monitoring wells MW-7 and MW-11 were non-detect for VOCs.

Monitoring wells MW-1, MW-2, MW-10, MW-14, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, and MW-22 are screened in the "deep" aquifer. The TCE detections for the "deep" aquifer wells from the sampling event which took place in July, 2003 ranged from 280 ppb to 2.1 ppb (MW- 19 and MW-1, respectively). The detections of DCE ranged from 6.1 ppb to 1.4 ppb (MW-16 and MW-14, respectively). Monitoring wells MW-10, MW-17, MW-18, MW-20, MW-21, and MW-22 were non-detect for VOCs.

A summary of Phase III analytical results is presented in Table 4.4. Historical VOC analytical results are shown in Figure 4.4.

TABLE 4.3
Detected Analytes - Groundwater
Phase II Pre-Aquifer Test
Remedial Investigation
Hamilton Sundstrand
Camdenton, Missouri

ANALYTE	UNITS	GROUNDWATER SAMPLES														MCL
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	
Methylene Chloride[3]	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	no MCL
1,2 Dichloroethene	ug/L	ND	ND	ND	2 [1]	8	ND	14	ND	ND	ND	48 [1]	ND	ND	ND	100 ug/L
Trichloroethene	ug/L	ND	2 [1]	39	56	170	ND	310 [1]	ND	ND	ND	1000 [1]	35	13	ND	5 ug/L
Toluene	ug/L	ND	ND	8	4 [1]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000 ug/L
Barium	ug/L	85.3	96.3	68.6	114	61.0	54.0	95.0	101	49.5	135	92.9	81.6	162	120	2000 ug/L
Lead	ug/L	52.5	8.3	26.6	18.7	7.1	7.2	13.4	6.8	ND	10.5	10.5	18.2	14.2	62.5	15 ug/L[2]
Chromium	ug/L	7.8	ND	29.4	61.7	ND	ND	20.8	ND	ND	7.5	ND	41.2	52.8	67.0	100 ug/L
Cadmium	ug/L	ND	ND	ND	3.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5 ug/L

(1) Laboratory Estimate
(2) No MCL (action level at tap)
(3) Suspected Laboratory Artifact
ug/L - micrograms / Liter (ppb)
VOCs by EPA Method 8260B
RCRA Metals by EPA Method 6010B
ND - Analyte not detected within reporting limits of the test
MCL - Maximum Contaminant Level from USEPA Drinking Water Regulations
Lead - no MCL (action level at tap)
Shaded areas - Reported levels above MCL (or above action level for lead)

TABLE 4.3 (cont'd)
Detected Analytes - Groundwater
Phase II Post-Aquifer Test
Remedial Investigation
Hamilton Sundstrand
Camdenton, Missouri

ANALYTE	UNITS	GROUNDWATER SAMPLES														MCL
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	
Acetone[3]	ug/L	ND	ND	ND	ND	ND	ND	ND	10	ND	ND	ND	ND	10	19	no MCL
1,2 Dichloroethene	ug/L	ND	ND	ND	4 [1]	9	ND	18	ND	ND	ND	64 [1]	4 [1]	ND	ND	100 ug/L
Trichloroethene	ug/L	ND	ND	ND	75	180	ND	400	ND	ND	ND	1,300 [1]	83	8	16	5 ug/L
Barium	ug/L	61.1	104	63.7	79.7	58.6	54.9	227	117	55.8	119	98	105	192	130	2000 ug/L
Lead	ug/L	3.8	27	12.7	ND	3.8	7.5	157	11.2	ND	14.9	49.3	25.8	66.9	190	15 ug/L[2]
Chromium	ug/L	ND	17.4	8.9	ND	7.6	5.9	129	13.3	ND	21.8	21.2	61.8	152	80.2	100 ug/L
Cadmium	ug/L	ND	ND	ND	ND	ND	ND	15.5	ND	ND	ND	ND	ND	ND	ND	5ug/l
2 - Butanone[3]	ug/L	ND	ND	ND	ND	ND	ND	8.0	ND	ND	ND	ND	4 [1]	ND	13	no MCL
Arsenic	ug/L	ND	ND	ND	ND	ND	ND	11.4	ND	ND	ND	ND	ND	ND	13.5	50 ug/L
Mercury	ug/L	ND	ND	ND	ND	ND	ND	0.25	ND	ND	ND	ND	0.23	ND	ND	2 ug/L
Tetrachloroethene	ug/L	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	7 ug/L

(1) Laboratory Estimate
(2) No MCL (action level at tap)
(3) Suspected Laboratory Artifact
ug/L - micrograms / Liter (ppb)
VOCs by EPA Method 8260B
RCRA Metals by EPA Method 6010B
ND - Analyte not detected within reporting limits of the test
MCL - Maximum Contaminant Level from USEPA Drinking Water Regulations
Lead - no MCL (action level at tap)
Shaded areas - Reported levels above MCL (or above action level for lead)

TABLE 4.4
Detected Analytes-Groundwater
Phase III
Hamilton Sundstrand Remedial Investigation
Camdenton, Missouri

Deep Aquifer Monitoring Wells		
	June-03	
	DCE	TCE
MW-1	ND	2.1
MW-2	ND	2.4
MW-10	ND	ND
MW-14	1.4	13.0
MW-16	6.0	71.0
MW-16D	6.1	72.0
MW-17	ND	ND
MW-18	ND	ND
MW-19	18.0	280.0
MW-20	ND	ND
MW-21	ND	ND
MW-22	ND	ND
GTARC	70.0 ug/L	5.0 ug/L

Shallow Aquifer Monitoring Wells		
	June-03	
	DCE	TCE
MW-5	9.4	210.0
MW-7	ND	ND
MW-8	37.0	610.0
MW-8D	33.0	610.0
MW-9	ND	230.0
MW-11	ND	ND
MW-12	60.0	1100.0
MW-13	8.5	190.0
GTARC	70.0 ug/L	5.0 ug/L

ug/L - micrograms / Liter (ppb)

VOCs by EPA Method 8260B

ND - Analyte not detected within reporting limits of the test

GTARC- Groundwater Target Concentrations from Cleanup Levels for Missouri (CALM)

Shaded areas - Reported levels above MCL

Mulberry Well Analytical Results

The discharge from the Mulberry well is sampled on a monthly basis and during aquifer testing. Appendix C contains a graph of the period from December 1999 to July 2003 showing the TCE results of the monthly groundwater sampling from the Mulberry well. The TCE results of the monthly sampling show fluctuations ranging from 6 ppb to 47.7 ppb. The data shows a relatively consistent range of 6 ppb to 9.4 ppb TCE until July-August 2001, after which elevated TCE spikes begin to occur. A table summarizing the results of samples collected from the Mulberry well during aquifer testing is presented in Table 4.5.

Investigation Derived Waste Analytical Results

Drill cuttings generated during the installation of the RI monitoring wells were retained at the City yard until the results from the analytical testing determined that they were non-hazardous. Purge water generated during the sampling of monitoring wells was retained at the City yard until sampling confirmed that it was non-hazardous. The analytical summary for the IDW is presented in Table 4.6.

AQUIFER RESPONSE

Aquifer testing was conducted using the Mulberry wells as an extraction point during the Phase I, Phase II, and Phase III field activities. The following is a discussion of those activities.

Phase I Aquifer Tests

During the Phase I activities it was determined that there were two disparate aquifer zones. Monitoring wells: MW-5, MW-8, MW-9, and MW-11 were relatively unaffected by

Table 4.5
Detected Analytes – Mulberry Well NPDES Discharge
Aquifer Pump Tests
Hamilton Sundstrand Remedial Investigation
Camdenton, Missouri

STEP TEST – PHASE I						
ANALYTE	UNITS	GROUNDWATER SAMPLE				NPDES DISCHARGE LIMITS
		MULBERRY STEP 1	MULBERRY STEP 2	MULLBERRY STEP 2A	MULBERRY STEP 2B	
Trichloroethene	ug/L	9	9	7	8	80 ug/L
CONSTANT RATE TEST – PHASE 1						
ANALYTE	UNITS	GROUNDWATER SAMPLE				NPDES DISCHARGE LIMITS
		MULBERRY 07111145	MULBERRY - 0712140	MULLBERRY – 07131130	MULBERRY - 0714115	
Trichloroethene	ug/L	9	6	7	6	80 ug/L
CONSTANT RATE TEST – PHASE II						
ANALYTE	UNITS	GROUNDWATER SAMPLE				NPDES DISCHARGE LIMITS
		MULBERRY - 12011400	MULBERRY – 11291420	MULLBERRY – 11301400	MULBERRY – 12021400	
Trichloroethene	ug/L	10	10	11	10	80 ug/L
VARIABLE RATE TEST - PHASE III – August 6-7, 2002						
ANALYTE	UNITS	GROUNDWATER SAMPLE				NPDES DISCHARGE LIMITS
		EXT-1	EXT-2	EXT-3	EXT4	EXT-4D
Trichloroethene	ug/L	13	13	12	12	11	80 ug/L
VARIABLE RATE TEST - PHASE III – August 6-7, 2002						
ANALYTE	UNITS	GROUNDWATER SAMPLE				NPDES DISCHARGE LIMITS
		EXT-CR-1	EXT-CR-2	EXT-CR-3	EXT-CR-R	EXT-CR-4D
Trichloroethene	ug/L	12	11	11	11	11	80 ug/L

ug/L – micrograms/Liter (ppb)
VOCs by EPA Method 8260B
NPDES – National Pollutant Discharge Elimination System

Table 4.6
Detected Analytes- Investigation Derived Waste
Hamilton Sundstrand Remedial Investigation
Camdenton, Missouri

ANALYTE	UNITS	Investigation Derived Waste Samples															
		MW 7-1	MW 7-2	MW 8-1	MW 10-1	MW 10-2	MW 10-3	MW 11-1	MW 9-1	MW 12-1	MW 13-1	MW 13-2	MW 14-1	MW 14-2	MW 14-3	MW 15-1	MW 15-2
Acetone (1)	ug/Kg	3	4	3	ND	ND	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride (1)	ug/Kg	ND	ND	ND	10	ND	4	4	3	2	ND	ND	5	3	ND	ND	ND
Chloroform (1)	ug/Kg	ND	ND	ND	ND	ND	ND	ND	ND	1	1	2	1	1	2	2	2
Barium	mg/Kg	10.6	7.8	6.5	5.6	5.8	10.2	7.3	7.4	7.3	14.6	13.1	12.2	7.7	15.4	11.3	25.2
Chromium	mg/Kg	1.6	3.4	2.3	2.2	1.9	2	1.5	1.3	1.4	4.1	5.5	3	1.8	5.1	5.5	6.6
Lead	mg/Kg	8.3	27.5	18.1	18.7	5	11.3	8.2	26.4	9	13.4	9.8	11.2	14.6	16.8	17.4	12.1
Cadmium	mg/Kg	1.7	0.77	1.8	1.4	ND	ND	0.93	3.4	0.54	0.89	0.46	0.86	0.91	1.1	0.76	0.66
Arsenic	mg/Kg	1.1	ND	ND	1.1	ND	1.8	1.4	ND	1.4	1.5	1.6	1.2	ND	1.7	1.6	2.8

(1) Suspected Laboratory Artifact
ug/Kg – micrograms/Kilograms (ppb)
mg/KG- milligrams/Kilogram (ppm)
VOCs by EPA Method 8260B
RCRA Metals by EPA Method 6010B
ND – Analyte not detected within reporting limits of the test

ANALYTE	UNITS	Investigation Derived Waste Samples						
		MW 16	MW 17	MW 18	MW 19	MW 20	MW 21	MW 22
Acetone (1)	ug/Kg	670	5	ND	ND	ND	9.6	100
Methylene Chloride (1)	ug/Kg	ND	ND	12	5.4	ND	ND	ND
Chloroform (1)	ug/Kg	ND	ND	ND	ND	ND	ND	ND
Barium	mg/L	0.49	0.61	0.39	0.72	0.25	0.7	0.47
Chromium	mg/L	ND	ND	ND	ND	ND	ND	ND
Lead	mg/L	0.0086	0.0078	0.062	0.01	0.025	0.014	0.016
Cadmium	mg/L	0.004	0.01	0.01	0.006	0.019	0.003	ND
Arsenic	mg/L	ND	ND	ND	ND	ND	ND	ND

(1) Suspected Laboratory Artifact
ug/Kg – micrograms/Kilograms (ppb)
mg/L- milligrams/ Liter (ppm)
VOCs by EPA Method 8260B
TCLP Metals by EPA Method 5030
ND – Analyte not detected within reporting limits of the test

ANALYTE	UNITS	Investigation Derived Waste Samples	
		Purge 1 11/1/02	Purge 2 5/22/03
Acetone	ug/L	ND	ND
Methylene Chloride	ug/L	ND	ND
TCE	ug/L	ND	ND
DCE	ug/L	ND	ND

ug/L - migrograms per liter PPB
VOCs by EPA Method 8260B
ND – Analyte not detected within reporting limits of the test
Purge water derived from groundwater sampling events

aquifer testing and determined to be screened in the "perched" zone, while in monitoring wells MW-1, MW-2, MW-3, and MW-4 drawdown was evident during the testing ranging from 2.46 feet to 9.33 feet in MW-3 and MW-1, respectively.

Review of the elevation data from the Step Test indicated that the Mulberry well could support a well yield of 685 gpm, creating stresses sufficient to induce measurable drawdown in the "deep" aquifer. A summary of the aquifer response during the Phase I aquifer testing is included in Table 4.7 and Figure 4.5. Hydrographs from the Phase I test are included in Appendix B.

Phase II Aquifer Tests

During the Phase II aquifer test, the observation wells included MW-1, MW-2, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, MW-11, MW-12, MW-13, MW-14, and MW-15. Drawdown data associated with the Constant Rate Test was evaluated to determine relative drawdowns from which to assess the influence produced by the extraction well. Evaluation of data collected from the eight "perched zone" monitoring wells (MW-5, MW-7, MW-8, MW-9, MW-11, MW-12, MW-13, and MW-15) indicated that no discernable effects associated with the groundwater extraction were observed. As depicted in the "perched zone" aquifer hydrographs, the potentiometric surface exhibits a generally consistent surface elevation during the Pre-Test monitoring period with some minor fluctuations. The minor fluctuations are attributed to barometric response to seasonal trends and/or aquifer stresses originating external to the test area.

Discernable drawdown was observed in each of the five "deep" aquifer system monitoring wells (MW-1, MW-2, MW-3, MW-4 and MW-14) located at distances of about 1094, 617, 784, 1,031 and 784 feet from the Mulberry well, respectively. Maximum observed drawdowns ranged between 1.68 feet and 8.75 feet (MW-3 and MW-14, respectively). The maximum observed drawdowns for each of the "deep" aquifer monitoring wells is presented in Table 4.7 and Figure 4.5.

Table 4.7
Maximum Drawdown in Feet
Phase I, Phase II, and Phase III Constant Rate Test
Hamilton Sundstrand Remedial Investigation
Camdenton, Missouri

Well Identification	Relative Screen Location	Phase I	Phase II	Phase III		
		72 Hour Constant Rate July 11-14, 2000	72 Hour Constant Rate Nov. 29- Dec. 2, 2000	72 Hour Constant Rate August 20-23, 2002	48 Hour Constant Rate Jan. 20-23,2003	48 Hour Constant Rate July 30- August 1, 2003
MW-1	deep	9.33	7.16	8.31	4.56	4.23
MW-2	deep	8.70	8.11	7.67	4.43	NA[3]
MW-3	shallow-deep	2.46	1.68	NA/abandoned	NA/abandoned	NA/abandoned
MW-4	shallow-deep	7.76	7.48	NA/abandoned	NA/abandoned	NA/abandoned
MW-5	shallow	ND	ND	NA[2]	NA[2]	NA[2]
MW-7	shallow	ND	ND	NA[2]	NA[2]	NA[2]
MW-8	shallow	ND	ND	NA[2]	NA[2]	NA[2]
MW-9	shallow	ND	ND	NA[2]	NA[2]	NA[2]
MW-11	shallow	ND	ND	NA[2]	NA[2]	NA[2]
MW-12	shallow	ND	ND	NA[2]	NA[2]	NA[2]
MW-13	shallow	ND	ND	NA[2]	NA[2]	NA[2]
MW-14	deep	NA[1]	8.75	8.21	4.75	4.33
MW-15	shallow	NA[1]	ND	NA/abandoned	NA/abandoned	NA/abandoned
MW-16	deep	NA[1]	NA[1]	9.53	6.15	5.45
MW-17	deep	NA[1]	NA[1]	6.93	3.66	4.18
MW-18	deep	NA[1]	NA[1]	NA[1]	7.88	8.18
MW-19	deep	NA[1]	NA[1]	NA[1]	9.82	10.17
MW-20	deep	NA[1]	NA[1]	NA[1]	NA[1]	4.6
MW-21	deep	NA[1]	NA[1]	NA[1]	NA[1]	5.8
MW-22	deep	NA[1]	NA[1]	NA[1]	NA[1]	-0.183

NA[1] Not applicable, prior to well installation
NA[2] Not applicable, shallow wells not monitored
NA[3] Not applicable, well inaccessible

Phase III Aquifer Tests

The first Phase III aquifer test was conducted in August, 2002 after monitoring wells MW-16 and MW-17 were installed. The second Phase III aquifer test was conducted in January, 2003 after MW-18 and MW-19 were installed. The third Phase III aquifer test was conducted in July-August, 2003 after MW-20, MW-21, and MW-22 were installed.

The first Phase III aquifer test was conducted August, 2002 and included observation wells: MW-1, MW-2, MW-14, MW-16, and MW-17. All of the observation wells were screened in the "deep" aquifer. The test included a Variable Rate Test and a Constant Rate Test.

The Variable Rate Test was initiated on August 6, 2002 at 0845 hours. The first step utilized an extraction rate of approximately 333 gpm. On August 6, 2002 at 1654 hours the second step was initiated by increasing the extraction rate to approximately 570 gpm. On August 7, 2002 at 0019 hours the third step was initiated by increasing the extraction rate to approximately 710 gpm. This rate could not be sustained and the rate quickly stabilized to approximately 680 gpm. Groundwater elevation data reflects the response to the Variable Rate Test in MW-1, MW-2, MW-14, MW-16, and MW-17. All of the well hydrographs showed varying degrees of slope increase as the pumping rate increased.

Upon completion of the Variable Rate Test, aquifer recovery was monitored for a period of approximately 14 days, during which time the aquifer recovered to a static condition.

The Constant Rate Test was initiated on August 20, 2002 at 0915 hours. The Constant Rate Test utilized an extraction rate of approximately 670 gpm.

Groundwater elevation data reflects the response to the August 20, 2002 Constant Rate Test in MW-1, MW-2, MW-14, MW-16, and MW-17. All of the well hydrographs showed

a relatively constant slope during the test. Maximum drawdown during the Constant Rate Test varied from 6.93 feet to 9.53 feet (MW-17 and MW-16, respectively).

Upon completion of the Constant Rate Test, aquifer recovery was monitored for a period of approximately 12 days, during which time the aquifer recovered to a static condition. A summary of the aquifer response during aquifer testing is included in Table 4.7 and Figure 4.5.

Subsequent Phase III Aquifer Tests

A 48 hour constant rate was conducted in January, 2003 and monitored with pressure transducers in observation wells MW-1, MW-2, MW-14, MW-16, MW-17, MW-18, and MW-19. All of the observation wells were screened in the "deep" aquifer. The 48-hour test was conducted with a pump rate of approximately 600 gpm. The drawdown ranged from 3.66 feet in MW-17 to 9.82 feet in MW-19. The maximum observed drawdown for each of the "deep" aquifer monitoring wells during the January 2003 48-hour constant rate test is presented in Figure 4.5.

A 48 hour constant rate was conducted in August 2003 and monitored with pressure transducers in observation wells MW-1, MW-14, MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, and MW-22 (MW-2 was not accessible during the test). All of the observation wells were screened in the "deep" aquifer. The 48-hour test was conducted with a pump rate of approximately 600 gpm. The drawdown ranged from -0.18 feet in MW-22 to 10.173 feet in MW-19. The maximum observed drawdown for each of the "deep" aquifer monitoring wells during the August 2003 48-hour constant rate test is included in Table 4.7 and Figure 4.5.

GROUNDWATER CHARACTERISTICS

The monitoring wells installed by HS during Phase I, Phase II, and Phase III (along with the existing monitoring wells previously installed by Modine and MDNR), were used to

assess the occurrence and behavior of groundwater within the separate "perched zone" and the "deep" aquifer system in and around the former lagoon. Groundwater within both the "perched zone" and the "deep" aquifer system occurs primarily within secondary porosity features (i.e. fractures, bedding plane separations, and dissolution cavities). The following is a discussion of the groundwater characteristics.

Groundwater Occurrence

"Perched Zone"

Groundwater within the "perched zone" system occurs under unconfined (water table) to semi-confined conditions. The "perched zone" monitoring wells typically exhibit groundwater at depths about 817 to 828 feet amsl across the area in and around the former lagoon (excluding monitoring well MW-10 that is not included in this discussion due to its distal location from the former lagoon). Table 4.8 presents a summary of groundwater elevation data. Saturated thickness of the "perched zone" range between approximately 1 to 8 feet, and appear to be controlled by the surface configuration of the low permeability zone that forms the base of the "perched zone."

Groundwater elevation data associated with the "perched zone" indicate that groundwater movement is generally from north to south (with local deviations to this flow direction). This general flow direction appears to be controlled by the occurrence depth and slope of the above referenced low permeability zone. Figure 4.6 presents the inferred potentiometric surfaces for the "perched zone" system in and around the former lagoon for June 2003.

Table 4.8
Summary of Static Groundwater Potentiometric Surface Elevations
Hamilton Sundstrand Remedial Investigation
Camdenton, Missouri

			June 24, 2003	
Well Identification	Ground Elevation (feet above mean sea level)	TOC Elevation (feet above mean sea level)	Depth to Water (feet below top of casing)	GW Elevation (feet above mean sea level)
MW-1	942.1	945.35	174.65	770.7
MW-2	960.9	962.99	186.25	776.74
MW-5	936.8	938.74	117.05	821.69
MW-7	1009.4	1009.07	191.37	817.7
MW-8	950.3	950.14	130.06	820.08
MW-9	965.5	965.28	150.11	815.17
MW-10	947.88	947.45	272.76	674.69
MW-11	920.6	920.32	107.2	813.12
MW-12	958.24	957.92	144.08	813.84
MW-13	994.89	994.58	174.19	820.39
MW-14	995.77	995.44	218.08	777.36
MW-16	936.845	936.575	160.59	775.985
MW-17	1005.261	1005.081	223.37	781.711
MW-18	920.771	920.471	150.05	770.421
MW-19	936.887	936.537	165.8	770.737
MW-20	995.67	995.38	221.18	774.2
MW-21	916.41	916.11	131.02	785.09
MW-22	960.350	960.15	278.99	681.16

TOC- Top of Casing
GW- Groundwater

MW-19

RECTOR

MW-16

APPROXIMATE LOCATION OF FORMER HULETT LAGOON

HIGHWAYS 5/7

ACCESS ROAD

FORRESTWAY

DAWSON

821.69
MW-5

MW-8
820.08

MW-17
817.70

814.00

819.00

820.00

819.00

813.12
MW-11
MW-18

BENTREE

813.74
MW-12

820.39
MW-13
MW-14

WEST MULBERRY LANE

SUNSET DRIVE

EAST MULBERRY LANE

814.00

815.00

816.00

817.00

818.00

MW-1

MW-2

MW-9

MW-17

MULBERRY DRIVE

815.17
MODINE MANUFACTURING COMPANY

SUNSET LANE

MULBERRY MUNICIPAL WELL

MW-10

LEGEND:

- ▲ MONITORING WELL LOCATION (SHALLOW)
- △ MONITORING WELL LOCATION (DEEP)
- ■ MUNICIPAL WELL LOCATION

0 100 150 250 300
SCALE IN FEET

NORTH

DESIGNED BY:	MGD
DRAWN BY:	WLG
APPROVED BY:	JGH
DATE:	09-05-03

SECOR

POTENTIOMETRIC SURFACE MAP- "PERCHED ZONE"
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE 4.6

S:\PROJECTS\061.03 PROJECTS\61UN.03001.00\cad files\RI Summaryt Sept 03\061 figure 4.7\surfer perched zone.dwg GH 3-19-03

"Deep" Aquifer

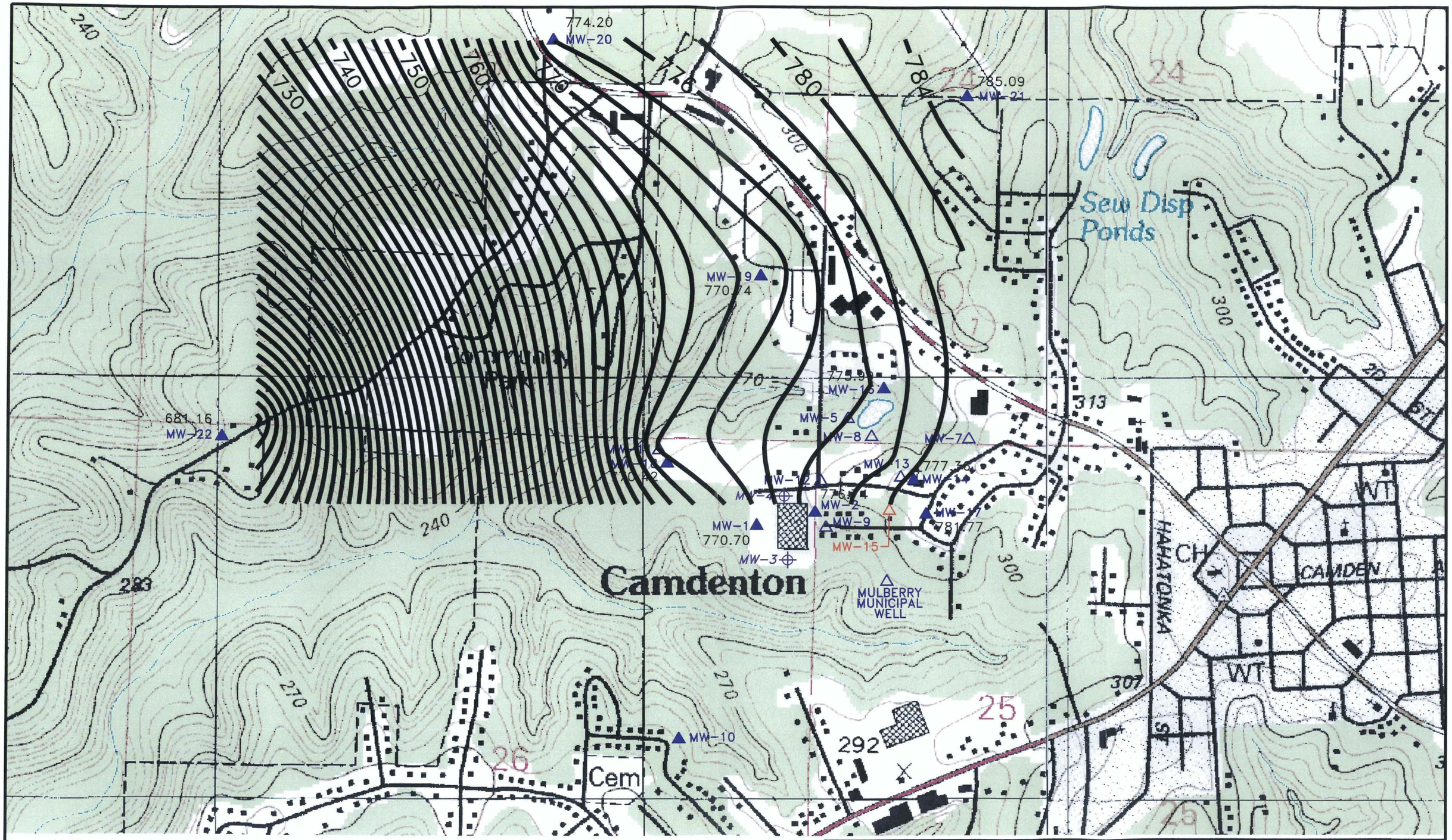
The "deep" aquifer system is separated from the overlying "perched zone" by an argillaceous interval that typically ranges between 30 and 40 feet thick. Groundwater within the "deep" aquifer system typically occurs at approximately 781 to 792 feet amsl across the area in and around the former lagoon. Table 4.8 presents a summary of groundwater elevation data. Inferred potentiometric surfaces based upon the "deep" aquifer monitoring data collected in 2003 are presented as Figure 4.7. Groundwater movement in the "deep" aquifer is generally from east to west, but the fracture network likely results in local flow/movement mimicking fracture orientations. Groundwater within the "deep" aquifer occurs entirely within bedrock material throughout most of the area, however, the low permeability zone is probably breached by erosion in the ravines west of the Facility.

Groundwater Level Fluctuation

Baseline groundwater level data was collected from the Phase I monitoring network in June 2000 and again in November 2000 utilizing the expanded monitoring network prior to the Phase II aquifer testing. Based on the limited duration monitoring activities (June 11, 2000 through November 27, 2000) it was determined that maximum groundwater fluctuations within the "perched zone" and "deep" aquifer systems ranged from about 1.83 feet at monitoring well MW-11 to 7.48 feet at monitoring well MW-2. No long term elevation monitoring has occurred since 2000.

Horizontal Hydraulic Gradient

Horizontal hydraulic gradients were estimated for the "perched zone" and "deep" aquifer systems utilizing groundwater elevation data collected during June, 2003 (refer to Figures 4.6 and 4.7). Horizontal hydraulic gradients associated with the "perched zone" ranged between 8.93×10^{-3} and 7.11×10^{-3} ft/ft, with an average value of 8.02×10^{-3} ft/ft.



LEGEND:

- MW-18 ▲ DEEP WELL
- MW-12 △ SHALLOW WELL
- MW-15 △ SHALLOW WELL (ABANDONED)
- MW-3 ⊕ MODINE DEEP WELL (ABANDONED)

—780— CONTOUR ELEVATION

0 700 1400

SCALE IN FEET

NORTH

REFERENCE: USGS 7.5 MINUTE QUADRANGLE: GREEN BAY TERRACE, MO 1983
USGS 7.5 MINUTE QUADRANGLE: CAMDENTON, MO 1983

DESIGNED BY:	MGD
DRAWN BY:	GLH
APPROVED BY:	MGD
DATE:	08-29-03

SECOR

POTENTIOMETRIC SURFACE MAP- "DEEP" AQUIFER
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE 4.7

S:\PROJECTS\061.03 Projects\61UN.03001.00\cad files\RI Summary SEPT 03\061 usgs figures\usgs-potmap.dwg wlg 07-11-03

Horizontal hydraulic gradients associated with the "deep" aquifer system ranged between $1.16x10^{-2}$ and $1.85x10^{-2}$ ft/ft, with an average value of $1.51x10^{-2}$ ft/ft.

NATURAL ATTENUATION

Groundwater System In-situ Findings

DO measurements associated with the four "perched zone" monitoring wells (MW-5, MW-7, MW-8, and MW-11) ranged between 5.6 ppm and 6.9 ppm (MW-5 and MW-7, respectively). ORP in-situ measurements ranged between 178 milli-volts (mV) and 211 mV (MW-7 and MW-5, respectively).

DO measurements associated with the two "deep" groundwater monitoring wells (MW-2 and MW-4) ranged between 5.26 ppm and 5.88 ppm (MW-4 and MW-2, respectively). ORP in-situ measurements ranged between 173 mV and 216 mV (MW-4 and MW-2, respectively).

Groundwater System Analytical Findings

Alkalinity concentrations associated with the three "perched zone" monitoring wells (MW-5, MW-7, and MW-11) ranged between 460 ppm and 820 ppm (MW-11 and MW-7, respectively). Nitrate concentrations ranged between 0.64 ppm and 229 ppm (MW-5 and MW-11, respectively). Sulfate concentrations ranged between 4.5 ppm and 24.9 ppm (MW-7 and MW-11, respectively). Methane was detected only at MW-5 at a concentration of 2.0 ppb. Neither ethane nor ethene was detected in any of the "perched zone" wells above the laboratory method detection limits. Chloride concentrations ranged between 8.1 ppm and 14 ppm (MW-7 and MW-11, respectively). TOC concentrations ranged between not detected (ND) and 1.5 ppm (MW-7 and MW-11, respectively). Iron concentrations ranged between 1,800 ppb and 9,030 ppb (MW-7 and MW-5, respectively). Manganese concentrations ranged between 64.7 ppb and 196 ppb (MW-5 and MW-7, respectively). Sodium concentrations ranged between

5,500 ppb and 6,940 ppb (MW-7 and MW-5, respectively). Calcium concentrations ranged between 115,000 ppb and 225,000 ppb (MW-7 and MW-5, respectively). Potassium concentrations ranged between 1,220 ppb and 4,950 ppb (MW-7 and MW-11, respectively). Magnesium concentrations ranged between 62,500 ppb and 139,000 ppb (MW-7 and MW-5, respectively).

Alkalinity concentrations associated with the two "deep" groundwater monitoring wells (MW-2 and MW-4) ranged between 390 ppm and 622 ppm (MW-4 and MW-2, respectively). Nitrate concentrations ranged between 0.2 ppm and 0.61 ppm (MW-2 and MW-4, respectively). Sulfate concentrations ranged between 1.5 ppm and 2.0 ppm (MW-4 and MW-2, respectively). Neither methane, ethane nor ethene was detected in any of the "deep" monitoring wells above the laboratory method detection limits. Chloride concentrations ranged between 2.6 ppm and 2.9 ppm (MW-2 and MW-4, respectively). TOC concentrations ranged between not detected (ND) and 5.1 ppm (MW-4 and MW-2, respectively). Iron concentrations ranged between 294 ppb and 2,100 ppb (MW-4 and MW-2, respectively). Manganese concentrations ranged between 25.3 ppb and 81 ppb (MW-4 and MW-2, respectively). Sodium concentrations ranged between 2,960 ppb and 9,140 ppb (MW-4 and MW-2, respectively). Calcium concentrations ranged between 83,300 ppb and 180,000 ppb (MW-4 and MW-2, respectively). Potassium concentrations ranged between ND and 4,480 ppb (MW-4 and MW-2, respectively). Magnesium concentrations ranged between 48,600 ppb and 107,000 ppb (MW-4 and MW-2, respectively).

No analysis has been conducted to assess natural attenuation since the Phase I activities. A summary of analytical results is presented in Table 4.9.

INVESTIGATION DERIVED WASTE

Drill cuttings were collected at a frequency of one per every 10 feet of bore hole advanced for monitoring wells drilled during Phase I and Phase II field activities (samples were collected every 5 feet during Phase III field activities), and screened with

TABLE 4.9
Detected Analytes - Natural Attenuation Evaluation
Hamilton Sundstrand Remedial Investigation
Camdenton, Missouri

ANALYTE	UNITS	GROUNDWATER SAMPLES					MCL
		MW-2	MW-4	MW-5	MW-7	MW-11	
Calcium	ug/L	180,000	83,300	225,000	115,000	164,000	no MCL
Sodium	ug/L	9,140	2,960	6,940	5,000	42,400	no MCL
Potassium	ug/L	4,480	ND	1,690	1,220	4,950	no MCL
Manganese	ug/L	81.0	25.3	196	67.4	176	0.05 mg/L
Magnesium	ug/L	107,000	48,600	139,000	62,500	109,000	no MCL
Iron	ug/L	2,100	294	9,030	1,800	4,410	0.3 mg/L
Alkalinity	mg/L	622	390	772	820	460	no MCL
Organic Carbon	mg/L	5.1	ND	1.2	ND	1.5	no MCL
Inorganic Chloride	mg/L	2.6	2.9	8.7	8.1	14	250 mg/L
Nitrate	mg/L	0.20	0.61	0.64	1.2	229	10 mg/L
Sulfate	mg/L	1.5	2.0	5.6	4.5	24.9	250 mg/L
Methane	ug/L	ND	ND	2.0	ND	ND	no MCL

Metals by EPA Method 6010B
ND - analyte not detected within the reporting limits of the test
Alkalinity by EPA Method 301.1
Organic Carbon by EPA Method 415.1
Inorganic Chloride by EPA Method 300
Nitrate by EPA Method 300
Sulfate by EPA Method 300
Methane by EPA Method RSK175
MCL - Maximum Contaminant Level from USEPA Drinking Water Regulations
ug/L - Micrograms / Liter (ppb)
mg/L - Milligrams / Liter (ppm)

a PID for the presence of volatile constituents at each of the monitoring well locations. Two samples exhibited the presence of volatile constituents above background levels. The sample collected from boring MW-8 at approximately 30 feet bgs exhibited a concentration of 1.9 ppm and the sample collected from the initial MW-10 boring at a depth of approximately 10 feet bgs exhibited a concentration of 0.8 ppm. Due to the very low detected volatile constituent concentrations, drill cuttings were not segregated within each boring.

Drill cuttings were sampled from each monitoring well boring and submitted to the analytical laboratory for analysis of RCRA metals per EPA Method 6010B and Method 7470A/7471A, and VOCs per EPA Method 8260B (see Table 4.6).

Results of the VOC analyses indicated the presence of methylene chloride, acetone, and chloroform in a limited number of samples. These analytes are common laboratory artifacts and are most likely not present in the samples collected.

Barium, lead, chromium, and cadmium were reported in the all the samples collected from the monitoring well borings. The presence of metals above detection limits is believed to be attributable to natural background levels (reference Section 2.0). IDW (once determined to be non-hazardous) was provided to the City for use as beneficial fill material.

Purge and development fluids from monitoring well installation and sampling activities were collected and stored in a holding tank at the City yard pending laboratory analysis. Analytical results found no VOCs or metals above detection limits with the exception of Barium (51.6 ppb) (see Table 4.6). Stored fluids were subsequently discharged at the City's POTW.

The Constant Rate Test was initiated on July 30, 2003 at 0900 hours and was terminated on August 1, 2003 at 0900 hours (48-hour total duration).

Post-Test Recovery Period

Post-Test groundwater elevation data collection from all monitoring points continued after each phase of testing until the aquifer system had recovered to near static levels. Water level measurements were collected at 15-minute intervals at each of the observation locations during the Post-Test period. Post-Test recovery data was collected for 13 days, during which time the aquifer recovered to near static conditions at each of the observation wells.

LABORATORY ANALYSIS

Laboratory analysis for Phase I and II activities was completed by Southwest Laboratory of Oklahoma, Inc. Phase III laboratory analysis was completed by Severn Trent Laboratories, Inc. of University Park, IL. Copies of all laboratory reports submitted by the aforementioned laboratories are found in Volume II to this RI Summary Report.

SECTION 5.0
SUMMARY AND CONCLUSIONS

SUMMARY

The following discussion summarizes the soil and groundwater findings in and around the former lagoon.

Soil Investigation

Soil investigation activities were focused on, and limited to, select areas located within the footprint of the former lagoon itself. The investigation was designed to evaluate the presence of residual contamination within portions of the former lagoon not addressed during post closure investigations performed by MDNR. The investigation consisted of the advancement of 15 Geoprobe^{TM} borings, the on-site laboratory analysis of 15 soil samples for the presence of TCE, and analysis of soil samples for VOCs and RCRA metals including TCLP analysis.

Results of these analyses from the on-site mobile laboratory indicate the detection of TCE from soils collected at one boring, (GP-9 at a depth of 7 to 8 feet bgs), at a reported concentration of 248.47 ppb. Laboratory analysis of soils from the same boring reported TCE concentrations of 3,100 ppb and DCE concentrations of 650 ppb. TCLP analysis of the four samples reported no VOCs above detection limits, and only barium for metals at concentrations ranging from 1.8 to 2.6 ppm (Figure 4.1).

Groundwater Investigation

Groundwater investigation activities were implemented in three phases. The overall monitoring well network presently consists of seven "perched zone" and ten "deep" aquifer monitoring wells located at or adjacent to the former lagoon and Facility, and one "deep" monitoring well (MW-10, "the sentinel well") located near the Blair well.

The monitoring well network was utilized for the characterization of groundwater systems (including flow directions within the "perched zone" and "deep" aquifer systems, flow gradients, and response to aquifer stresses imposed by groundwater extraction), the occurrence, distribution and magnitude of groundwater contamination within the aquifer systems underlying the former lagoon. Additionally, the monitoring well network was utilized to evaluate the occurrence and effectiveness of natural attenuation within the aquifer systems.

To facilitate the above characterizations, groundwater samples were collected and analyzed for the presence of VOCs and RCRA metals during four separate events: Pre-Phase I (June 26-27, 2000), Post-Phase I (July 19-20, 2000), Pre-Phase II (November 2 through 27, 2000), and Post-Phase II (December 20, 2000 through January 5, 2001). Phase III activities included collecting groundwater samples during the Pre-Test (July 15-17, 2002), Post-Test (August 27-28, 2002), Pre-Test (January 15-16, 2002), and Pre-Test (June 24-July 18, 2003).

Results of these analyses indicated the presence of VOCs in monitoring wells MW-1, MW-2, MW-3 (abandoned), MW-4 (abandoned), MW-5, MW-8, MW-12, MW-13, MW-14 and MW-15 (abandoned), MW-16, and MW-19. The detected VOCs consist of TCE, DCE and toluene. TCE detections ranged between 2.1 ppb and 1,100 ppb (MW-1 and MW-12 respectively). DCE detections ranged between 1.4 ppb and 64 ppb (MW-14 and MW-12 respectively). Toluene detections occurred in monitoring well MW-3 and MW-4 during the Phase II Pre-Test sampling event at concentrations of 8 ppb and 4 ppb, respectively. Previous monitoring events from Modine and MDNR (prior to 1998; as shown in Figures 4.4 and 4.5) have indicated the presence of VOCs in MW-1, MW-3 (abandoned), and MW-4 (abandoned).

Results of metals analyses indicated the presence of lead, barium, cadmium, chromium and arsenic within portions of the "perched zone" and "deep" aquifer systems. Lead concentrations ranged between 3.5 ppb and 62.5 ppb. Barium concentrations ranged between 49.5 ppb and 192 ppb. Cadmium was detected only in MW-5 at concentrations ranging from 3.2 ppb to 3.8 ppb. Chromium concentrations ranged between 5.8 ppb and 152 ppb. Arsenic was detected in only monitoring well (MW-15) during the Phase II Post-Test sampling event at a concentration of 13.5 ppb.

Results associated with aquifer tests indicate that the stresses generated by groundwater extraction from the Mulberry well are measurable within the "deep" aquifer system. The maximum observed drawdowns associated with the Phase III Constant Rate Test (excluding MW-22) ranged between 4.22 feet and 10.17 feet (MW-1 and MW-19, respectively). Monitoring well MW-22 did not appear to be affected by the aquifer testing.

Natural Attenuation

A review of the electron acceptors (that indicate reductive processes) suggest there does not appear to be significant differences in DO, sulfate, and nitrate concentrations when non-impacted wells are compared to impacted wells. This further suggests that little (if any) reductive activity is occurring in the aquifer systems.

In terms of metabolic byproducts, ethane and ethene were not detected at levels suggesting dehalogenation is occurring. The review of existing data suggests that the former lagoon likely contained enough organic matter to act as an electron donor to support dehalogenation. However, the absence of these byproducts within samples collected from the monitoring well network ("perched zone" and "deep" aquifer monitoring wells throughout the investigation area) indicate that dehalogenation does not occur within the bedrock strata.

A review of these indicators suggests that in-situ conditions are not present to support further effective natural degradation of the VOC contaminants of concern.

Constituents of Concern

VOCs

The RI findings suggest that VOCs continue to be the constituents of concern in groundwater. Laboratory analysis identified TCE and DCE in several monitoring wells above detection limits. Other VOCs detected (most notably acetone and methylene chloride) are most likely attributed to laboratory interferences. The presence of toluene in MW-3 and MW-4 during the Phase II Aquifer Test (Pre-Test) has not been found in previous sampling events. The toluene presence in MW-4 may have been attributed to surface water runoff from the surrounding asphalt parking lot that was infiltrating through the faulty well cap seal on MW-4. MW-4 was decommissioned by Modine in 2002.

Metals

The presence of metals was noted in several soil samples collected from the former lagoon. It is believed that metals concentrations above detection limits reflect the natural occurrence of metals in soils in the Central Missouri area. Based upon data from the University of Missouri – Columbia, the average concentrations for select elements that occur naturally in soil is estimated as follows:

As	2.5 – 72 ppb
Ba	100 – 1500 ppm
Cd	1 – 11 ppm
Cr	10 – 150 ppm
Hg	0.01 – 0.8 ppm
Pb	10 – 7000 ppm

(reference Activity and Movement of Plant Nutrients and Other Trace Substances in Soils. Hoette and Brown, University Extension, 1999).

Metals concentrations noted in all soil samples were well within the aforementioned ranges. With this in mind, the need to address metals impacts as constituents of concern does not appear to be warranted.

The presence of metals at concentrations above detection limits was noted in several monitoring wells. Elevated concentrations of select metals (most notably barium, lead, and chromium) are most likely attributable to their natural occurrence in groundwater. This is further supported through analytical results where hexavalent chromium was not present in concentrations above detection limits. This suggests that metals in groundwater (in particular chromium) are most likely not constituents of concern, and further activities to address potential metals impacts do not appear to be warranted. MDNR reviewed metals data and concurred with elimination of metals analysis in subsequent Phase II and Phase III activities.

SUMMARY OF FINDINGS

The following discussion summarizes the findings from HS' RI activities, and focuses on the former lagoon, groundwater characteristics, and extent of groundwater contamination.

Former Lagoon

It appears the decommissioning/closure activities implemented by the City in 1989 (and subsequently approved by MDNR) sufficiently remediated residual soil contamination associated with the former lagoon. Results of the soil investigation activities performed within the footprint of the former lagoon (2000 RI activities and 1999 MDNR activities) indicate the presence of TCE and DCE in only 3 of 25 borings completed. TCE concentrations ranged from 240 ppb to 9500 ppb, and DCE concentrations range from

140 ppb to 650 ppb. These concentrations were detected at depths ranging from 6 to 9 ft bgs.

The presence of VOCs above TCLP detection limits could be considered "worst-case" in terms of contribution of impacts to groundwater. As previously mentioned in Section 4.0, TCLP analysis of select soil borings (including those that exhibited the highest concentrations detected through field screening) demonstrated that TCE and DCE concentrations were not present above detection limits (25.0 ppb). These data indicate that VOC contribution to groundwater from leaching of residual VOCs in soil should not occur.

Based upon the presence of VOCs in only 3 of 25 borings (MDNR and HS), the minimal potential for exposure to humans (due to their location at depth), and the apparent non-existent likelihood of VOCs leaching into groundwater at levels above regulatory limits, the need for soil remedial activities does not appear to be warranted.

Groundwater Characteristics

Based upon groundwater elevation data collected during the RI, the presence of two groundwater zones beneath the former lagoon (and surrounding area) were identified. These groundwater systems consist of a thin, perched groundwater zone referred to as the "perched zone" and the underlying "deep" aquifer. The potentiometric surface elevation of the "perched zone" occurs at depths ranging from about 820 to 830 feet amsl. The potentiometric surface elevation of the "deep" aquifer occurs at depths ranging from about 678 to 800 feet amsl.

Results of contaminant concentration and distribution data suggest that the majority of contaminant mass (VOCs) has accumulated within the "perched zone" due in part to the presence of the low permeability zone that inhibits vertical migration and forms the base of the "perched zone" system. The base of this low permeability zone (exhibiting a surface elevation of approximately 693 to 789 feet amsl) appears to be laterally

continuous across the former lagoon (and surrounding areas) and likely influences horizontal groundwater and contaminant migration within the "perched zone" system. Groundwater contamination detected within the "deep" aquifer appears to be a result of the limited vertical migration through the overlying low permeability zone. Based upon information reviewed, it appears that TCE concentrations above MCLs were first detected in the Mulberry well in February 1997. The TCE results of the monthly sampling of the Mulberry well show fluctuations ranging from 6 ppb to 47.7 ppb. The data shows a relatively consistent range of 6 ppb to 9.4 ppb of TCE until July-August 2001, after which elevated TCE spikes begin to occur. The spring–summer of 2001 is when excavations of contaminated soil occurred at the Facility.

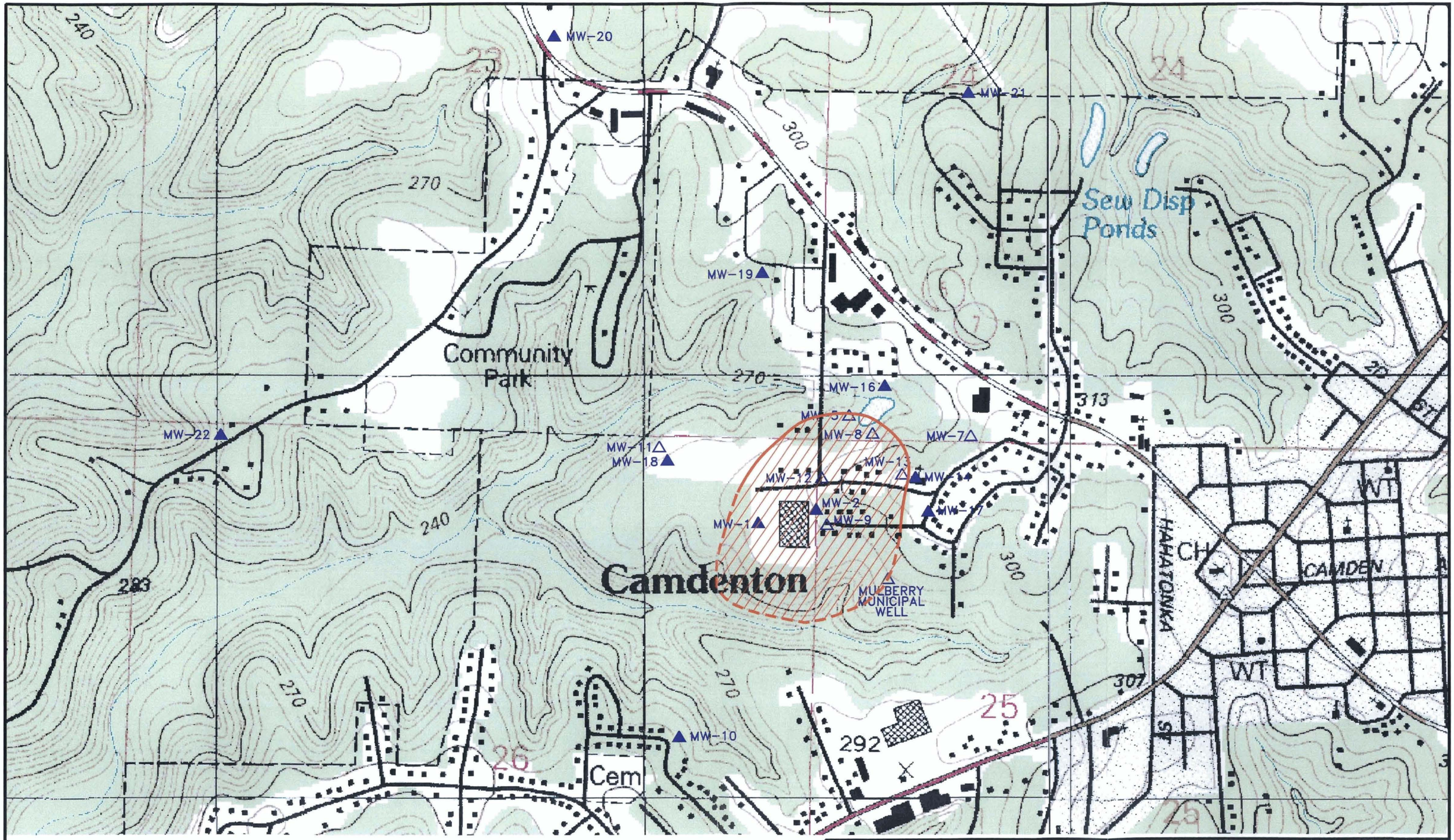
Results of the Aquifer Tests indicate that the stresses generated by groundwater extraction from the Mulberry well are measurable within the "deep" aquifer system. Measured drawdowns associated with these Aquifer Tests suggest that hydraulic influences can be exerted within the "deep" aquifer beyond the former lagoon. This also suggests that hydraulic containment of contaminants identified within the "deep" aquifer system can be achieved through the continuous operation of the Mulberry well. Analytical and potentiometric data suggest that groundwater movement and VOC migration are strongly influenced by preferential pathways within the fractured (i.e; vertical fractures and bedding plane separations) bedrock. This is supported by the VOC impacts noted in MW-19, but absent in MW-18. Groundwater elevation data suggest that groundwater flow in the "deep" aquifer follows a westerly direction.

Observed drawdowns in select monitoring wells during the July 30, 2003, 48-hour Pumping Test supports the interpretation that groundwater movement is strongly influenced by the fractures in the "deep" aquifer. In particular, MW-17, a monitoring well in close proximity to the Mulberry well, had an observed drawdown of 4.18 ft. compared to MW-19, a monitoring well more distal from the Mulberry well, where a drawdown of 10.17 ft. was observed. These drawdown observations are likely attributable to the influences of the fractured nature of the bedrock aquifer. This becomes more apparent when monitoring well locations and observed drawdowns are compared to observed

fracture orientations in the area. A review of fracture orientations at numerous bedrock outcrop locations along the ravines near the former lagoon and Facility indicated a primary fracture set orientation of approximately N 50^0 E and a secondary fracture set orientation of approximately N 35^0 W. During previous investigations (conducted primarily by Modine), a predominate N 50^0 E fracture set was also identified. Appendix E is a rose diagram showing the predominance of fracture orientations observed in the bedrock outcrops. When these fracture orientations are compared with major erosional features within the topographic area, there are similar orientations between some of the major ravines and the primary and secondary fracture orientations. Erosional features are often formed as a result of fracture influences. An evaluation of observed fracture orientations and erosional alignments suggests that MW-19 is located within a primary fracture set zone that could be interconnected with other primary and secondary fracture set zones that extend to the Mulberry well. The apparent interconnectiveness of these fracture sets (zones) help explain why the drawdown in MW-19 is greater than that in monitoring wells located closer to the Mulberry well that are not situated directly within fracture set zones. Several North-South and East-West erosional features were also noted within and adjacent to the area. The relationship of these features to potential fracture influences has not been determined at this time.

Extent of Groundwater Contamination

The RI activities have significantly helped in understanding the extent of contaminant distribution in the "perched zone" in and around the former lagoon. The extent of the TCE plume in the "perched zone" appears to be west of MW-7 (non-detect for VOCs) and east of MW-11 (non-detect for VOCs). The apparent extent of contamination in the "perched" zone is shown on Figure 5.1. The apparent extent of the TCE plume in the "deep" aquifer appears to be south of MW-20 and MW-21 (both non-detect for VOCs), north of MW-10 (non-detect for VOCs), east of MW-18 (non-detect for VOCs), west of MW-17 (non-detect for VOCs). The apparent extent of contamination in the "deep" aquifer is shown on Figure 5.2.



LEGEND:

MW-18 ▲ DEEP WELL

MW-12 △ SHALLOW WELL

EXISTING MONITORING WELL LOCATION

AREA OF DELINEATED TCE CONTAMINATION

AREA OF POTENTIAL TCE CONTAMINATION

0 700 1400

SCALE IN FEET

REFERENCE: USGS 7.5 MINUTE QUADRANGLE: GREEN BAY TERRACE, MO 1983
USGS 7.5 MINUTE QUADRANGLE: CAMDENTON, MO 1983

NORTH

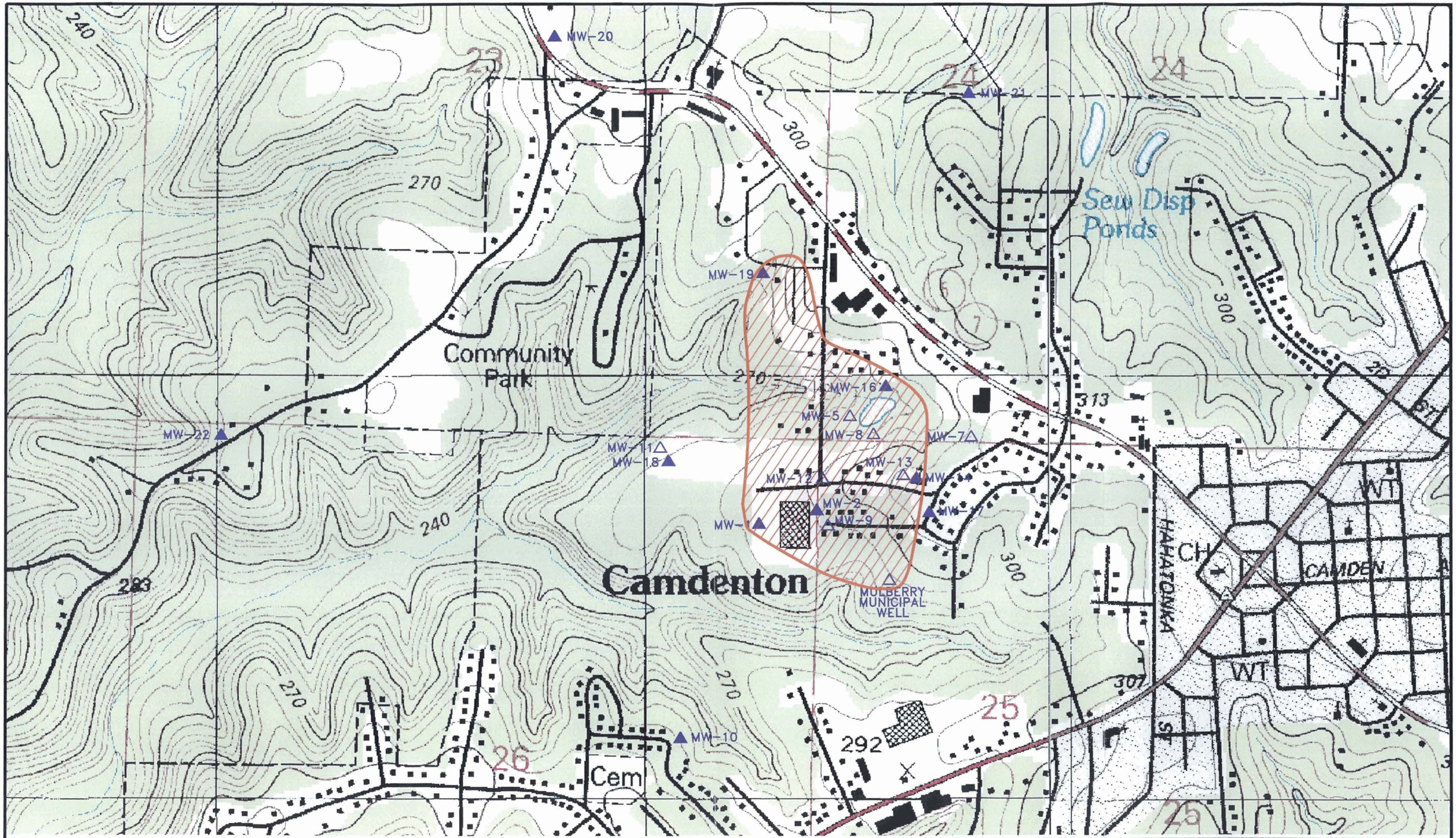
DESIGNED BY:	MGD
DRAWN BY:	GLH
APPROVED BY:	MGD
DATE:	09-05-03

SECOR

MAP SHOWING DELINEATED EXTENT OF TCE PLUME IN THE "PERCHED ZONE"
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE 5.1

S:\PROJECTS\061.03 Projects\61UN.03001.00\cad files\RI Summary SEPT 03\061 usgs figures\figure 5.1.dwg wlg 07-11-03



LEGEND:

MW-18 ▲ DEEP WELL

MW-12 △ SHALLOW WELL

EXISTING MONITORING WELL LOCATION

AREA OF DELINEATED TCE CONTAMINATION

0 700 1400

SCALE IN FEET

NORTH

REFERENCE: USGS 7.5 MINUTE QUADRANGLE: GREEN BAY TERRACE, MO 1983
USGS 7.5 MINUTE QUADRANGLE: CAMDENTON, MO 1983

DESIGNED BY:	MGD
DRAWN BY:	GLH
APPROVED BY:	MGD
DATE:	09-05-03

SECOR

MAP SHOWING DELINEATED EXTENT
OF TCE PLUME IN THE "DEEP AQUIFER"
FORMER HULETT LAGOON
HAMILTON SUNDSTRAND
CAMDENTON, MISSOURI

JOB NO. 61UN.03001.00 FIGURE 5.2

S:\PROJECTS\061.03 Projects\61UN.03001.00\cad files\RI Summary SEPT 03\061 usgs figures\figure 5.2.dwg wlg 07-11-03

Current local groundwater usage would also suggest that exposure pathways from the "perched zone" are remote at best. As mentioned previously, City residents receive potable water from the City's municipal well system (except for the Mulberry well), which draws from the deeper aquifers. Usage of the "perched zone" by residents in the former lagoon area does not appear to occur. One exception may be the Burnau well on Benttree Avenue. Although it is uncertain whether this well may be screened in the "perched zone," abandoning this currently non-operational private well will eliminate an exposure pathway. Additionally, the "perched zone" is not an aquifer from a practical, public use perspective (as a potable water source) or a regulatory perspective. Missouri regulations state that the "perched zone" is not defined as an aquifer as the perched unit does not store or transmit water in recoverable quantities sufficient to be utilized, or that could be utilized, as a water source for private or public use (reference Title 10 CSR 20-2.010).

As previously mentioned in Section 2.0, the City currently operates the Mulberry well periodically in its attempt to contain TCE in the general area of the Mulberry well and to prevent TCE migration to other City wells, (most notably the Blair well). At the onset of this investigation, the effectiveness of the City's pumping regime was unknown. The results of the aquifer pump tests indicate that the City's periodic pumping activities may be inhibiting the migration of TCE on a limited basis. The implementation of continuous pumping of the Mulberry well (with institutional controls) should provide effective hydraulic containment of VOCs in the "deep" aquifer.

An important aspect of the RI has been the ability to review limited technical data generated by Modine as part of their RCRA Corrective Action at the Facility. Data generated by Modine and HS demonstrates that the former lagoon and Facility were likely contributors to groundwater impacts (both "perched zone" and "deep" aquifer). Based on the City's closure of the former lagoon and Modine's removal of impacted soils at the Facility, it appears pathways for further containment migration to groundwater have been eliminated.

The presence of these historical source areas, coupled with complex fractured geology and separate hydrogeologic zones requires future groundwater activities (investigations, feasibility studies, remedial action, etc.) to be addressed on a regional basis.

Although HS and Modine are pursuing closure under different regulatory programs (Cooperative Program and RCRA, respectively), it would be beneficial if future actions addressing the regional groundwater impacts could be developed such that both programs could be satisfied.

CONCLUSION

Based upon the RI findings, the following can be summarized:

- Impacted soils at the former lagoon (as well as at the Facility) have been adequately addressed and do not pose a significant risk to human health or the environment.
- Groundwater impacts have been adequately characterized in terms of contaminants of concern (TCE and DCE).
- The extent of groundwater impacts ("perched zone" and "deep" aquifer) has been determined.
- The Mulberry well has the ability to hydraulically contain VOCs within the "deep" aquifer plume.

The objective of the RI process is not the unobtainable goal of removing all uncertainty, but rather to gather information to support an informed risk management decision regarding which remedy appears to be most appropriate for a given site (reference *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, USEPA Interim Final, October 1988).

The aforementioned USEPA objective has been the basis for HS' RI efforts to date. As stated in the RI Work Plan, HS' overall objective was to help protect the City's potable

water supply system. Through the RI activities to date, the nature and extent of soil impacts at the former lagoon have been identified such that residual soil contaminated was adequately remediated by the City's closure activities; the geology and hydrogeology have been adequately characterized such that two hydrogeologic units("perched zone" and "deep" aquifer) have been identified; geophysical data has helped map the somewhat impermeable barrier between the "perched zone" and the "deep" aquifer; an extensive monitoring well network has identified the extent of VOC contamination in groundwater within the regional area; technical data and observations have identified fracture sets within the regional geology that tend to support potential pathways for migration (especially prior to the installation of the Mulberry well); and hydraulic data has demonstrated that the Mulberry well has a significant influence on regional hydrogeology such that its operation likely has prevented impacts from migrating beyond the current plume extent, and as a minimum needs to be continually operated as an interim remedial measure to contain the contaminant plume within the localized area.

HS believes that RI objectives have been met such that the next steps to a practical remedial solution can be initiated. These steps would include completion of a Human Baseline Risk Assessment, Treatability Investigations (if needed), and a Feasibility Study to arrive at a practical remedy selection to address groundwater impacts and to continue to protect the City's potable water supply.

Newspapers.com
https://www.newspapers.com/image/305595635

Springfield Leader and Press (Springfield, Missouri) · Mon, Jul 10, 1972 · Page 16

Downloaded on Jun 29, 2017

Dawson Metal Products Camdenton Facility #2
Camdenton, Mo
Site Inspection
SFLP, 1972

16 Mon., July 10, 1972 SPRINGFIELD (Mo.) LEADER-PRESS

Mini-Mobile Seeks Blood

In Visit Friday To Industry Here

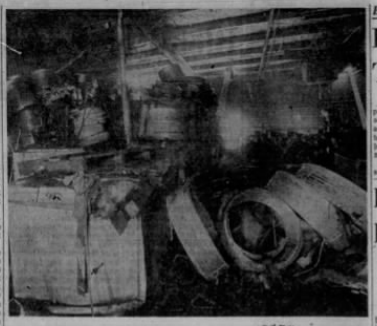
Charles F. Kitley, 3129 West Monroe, contributed more blood last week, making him a member of the Two-Gallon Club at the Springfield Regional Red Cross Center.

New members of the One-Gallon Club were Nancy Lane Wyatt, 317 North Belview, and Janet A. Vahlkick, Route 11.

The Red Cross Bloodmobile will be in the Ozarks two days this week in a drive to obtain 250 pints of blood. The mobile unit will be in the West Plains First Christian Church on Wednesday from noon to 5:30 p.m. On Thursday the unit will be at the Mountain View Presbyterian Church from 1 to 6 p.m.

For the first time a Mini-Mobile will visit the Pneumatics Division, North American Rockwell, 4840 West Kearney, Friday morning from 9 to 12.

The center, located at 1720 East Portland, will be open tomorrow through Friday from 1 to 4:30 p.m.



Staff Photo

As early morning fire Sunday, which caused extensive damage to the Dawson Metal Products Company in Camdenton, sent toxic fumes rolling over the area, requiring the evacuation of more than 100 persons from their homes. Only a handful of employees at the plant were back to work today as cleanup operations continued.

Damaged Plant Plans Tuesday Operations

Fires Fumes-Forced Evacuation Praised by Lake Area Workers

CAMDENTON — "You would have thought it was planned for a year the way the fire, police, sheriff departments and the medical center worked."

That was the reaction of Billy Cochran, owner of Lake of the Ozarks Ambulance Service, to an early morning fire Sunday that spread toxic fumes to the northwest of here, requiring the evacuation of more than 100 area residents from their homes.

The fire, which began shortly before midnight at the Dawson Metal Products Co., the largest manufacturing plant in Camden County, was caused by spontaneous combustion which ignited in the vicinity of a vapor degreasing unit, Richard W. Dawson, president of the company, said.

"It's going to take a week or so to determine the extent of the damage because there are a lot of unknowns," Dawson said. "We have two of the cranes running and the lighting. We are hoping to start some operations Tuesday."

Only a skeleton crew of the 275 employees at the plant reported to work today as cleanup operations continued.

* * *

More than 40 firefighters from the Camdenton, Camden County, Eldon, Lake Ozark and Osage Beach volunteer companies fought the blaze which caused extensive damage to the 5-year-old facility.

Seventy-five employes were working on a production line at the time of the fire, but none was injured. The only known injury was to an Osage Beach fire fighter, who was treated and released at Camdenton Memorial Center for smoke inhalation.

Smoke and toxic fumes from the fire rolled down into the town of Linn Creek, population 288, and up to the Ozark Trails Campground, located just off U.S. 54 About 30 campers units were in the park.

The first to be evacuated were Mr. and Mrs. Willy Rice and their grandchildren. Rice, who works for the Dawson Company, lives right across the street.

"We put handkerchiefs over our faces and left," Mrs. Rice said. "I was afraid I wouldn't have a chance to come back Sunday."

But, the Rice family did return Sunday morning to find that metal parts around the home had rusted.

* * *

Cochran, who had five ambulances in operation during the fire, reported that all residents living on or below a one-mile stretch of Mo. 5 between the Reed Funeral Home and the Community Christian Church were evacuated. Cochran termed the evacuation the "best disaster operation I've seen."

The emergency proved people can work together if they want to, said Mrs. Clark Westhoff, of Linn Creek.

"A neighbor called me and then cars came up and down the road, helping people, and taking them to the First Baptist Church," her husband said. "By the time we got ready to go there were loudspeakers warning everyone."

The Baptist church accommodated from 200 to 400 persons through the night offering coffee and later food for the hungry and pews for the sleepy.

"You could see the hazy-like condition among the trees," said Mrs. Clifton Chally, who with her husband owns the Ozark Trails Campground. "Everybody was very cooperative and very anxious to do the right thing. We didn't know really what was going on. With the word 'fire' you automatically think of a woods fire around here.

The campers, who were told to evacuate about 2:30 a.m., were the last to arrive at the church.

* * *

Camdenton Fire Chief Gomer Richards said a heavy oil sludge used in keeping the toxic fumes near the ground, "It was the biggest fire we ever had," he said. "In a small town like this you are not equipped to handle chemical fires. Water was no problem because we had a 6-inch line, but we needed air packs to go into the building and we only had three packs."

Twelve more air packs were found later and the fire was put out around 4 a.m. Richards said. But, firemen remained on the scene for several more hours.

Sheriff Tom Edwards made the call for the involuntary evacuation of the area. His office said the chemicals and gases encountered included trichloroethylene, nitric acid, hydrochloric acid, liquid oxygen, zinc metal shavings, aluminum created toxic gas, chlorine, phosgene, and carbon monoxide.

"This is the second chemical accident in less than a week for us," said Camden firefighter Daryl Currier. "On July 4th a propane gas tank overturned. There was no fire on that one but I'll tell you it was something to have that lying there and have the propane slowly escaping. It was a living 500-pound bomb. We worked on it releasing the gas, getting it washed down and handling it with kid gloves so as not to make a spark that would set it off. We were lucky on that one and I'd say we were lucky on this one today."

The Dawson plant manufactures air conditioner parts for both stationary and automotive units. The Chrysler Corporation is reportedly a heavy user of Dawson products.

Car-Truck Crash Injures Three

LICKING (Special) — A car-truck collision early today on U.S. 63, two miles south of here, sent three persons to Texas County Hospital in Houston.

Admitted for treatment of broken ribs and bruises was Arthur Haney, 70, Houston, the driver of a northbound pickup truck which collided headon with a car driven by Gregory Patterson, 19, Moniteau View.

Troopers said Patterson, whose car was on the wrong side of the road, was released after treatment for lacerations and bruises, and his passenger, Ronald Sapanzic, 21, Cabool, was released after treatment for bruises and abrasions suffered in the 4:40 a.m. crash.

ROLLA — Dr. Ted P. Smith, Rolla, is the new chief of staff at Phelps County Memorial Hospital here.

Lexington Is Having 150th

LEXINGTON (UPI) — This historic Missouri river city launched its sesquicentennial celebration Sunday with an old fashioned ice cream social which drew about 200 persons.

Residents dressed in Civil War attire strolled downtown streets to see exhibits in store windows.

Visitors toured Anderson House, which was built in 1833 and served as a hospital during the Battle of Lexington in 1861.

The first performance of a historical pageant with a cast of 300 persons was scheduled for tonight, along with a re-enactment of the battle of Lexington.

Bond Urges in Vi

Hike Mec To Nursing Homes

Increased welfare Medicaid payments to nursing homes serving elderly indigents were advocated today by State Auditor Christopher (Kit) Bond, following a tour of Grand Acres nursing home here.

Bond, who is one of five men seeking the Republican guberna-

torial nomination, said that passage of new law by the last session of the General Assembly will mean that 10,000 more nursing home beds will be needed next year.

In remarks prepared for a 1:30 p.m. press conference following a noon tour of the facility, Bond said, "The new board home law, which was approved earlier this year, prohibits boarding homes from having any bedridden residents or any residents who require a nurse, or even regular personal services."

* * *

"This new legislation is a major step in the right direction to assure high quality treatment of the elderly. But it will also mean finding new places for the bedridden currently living in boarding homes."

Bond said the new statutes, which take effect in mid-August, give each locality around the state the option of how to provide nursing home facilities. "They can be provided by private organizations, by local nursing home districts or by present boarding homes which are willing to provide the services and meet the standards for nursing homes," he said.

He said that officials had estimated that 9000 bedridden patients in metropolitan areas and 3000 in rural areas will have to move into nursing homes because of the new law.

* * *

"The state has the obligation to increase welfare medicaid payments to nursing homes serving the indigent elderly. This would help the elderly who require special care in a nursing home. It also would assist the nursing homes on providing quality care and adequate living conditions," he said.

Bond said that persons 65 years of age or older make up about 12 per cent of Missouri's population, and in 21 rural counties the age group comprises at least 20 per cent of the population.

"If we are going to keep the promise of high quality care implied in the new standards," he concluded, "then we are going to have to provide the dollars for that care."

Hearing Set In Murder

Lebanon Pair Held On $50,000 Bonds

BUFFALO (Special) — Two Lebanon men face preliminary hearings here at 10 a.m., July 25, in connection with the June 1 slaying of a 39-year-old Flat man.

Tom Wimberley, 36, and Jerry Warmer, 27, were arraigned in Dallas County magistrate court this morning on first-degree murder charges in the death of Porter Morris.

Dallas County Sheriff Jerry Cox said he is still seeking 27-year-old James C. Williams, also of Lebanon, who has been charged in connection with the murder.

Bonds on the murder charges were set at $50,000 each for Warmer and Wimberley. The former, also charged with arson of a dwelling, is being held in lieu of an additional $20,000 bond on that count.

Morris's body was found in the charred ruins of his home shortly after the house had been destroyed by fire. A coroner's inquest June 26 was able only to determine that Morris died "of cause or causes unknown," but authorities learned later that the man had been robbed and shot before the fire was set in his house, according to Sheriff Cox.

Some insects, such as certain species of grasshoppers and katydids have their hearing organs located on the tibia of each foreleg. There are 15,200 species of grasshoppers and crickets.

S of O, Capital Honor Dalton

POINT LOOKOUT (Special) — Memorial services for former Gov. John M. Dalton were held concurrently at 11 a.m. Sunday in the Williams Memorial Chapel at the School of the Ozarks and in Jefferson City as the family requested.

Dalton had been a member of the S. of O board of trustees since 1958.

The president of S of O, M. Graham Clark, conducted the service and the chapel choir was led by Dr. John Mizell, of the S of O music department.

Arkansas Pair Hurt As Car Tips in Ditch

PINEVILLE (Special) — Two Arkansas men went to Gravette, Ark., Medical Center following a late Saturday accident on a rural road, 5 miles west of here, the highway patrol reported.

Treated for scalp lacerations was Dwayne Curbo, 21, Lowell, a passenger in a car driven by Debra Davenport, 21, Bentonville, Ark., which left a curve and overturned in a ditch, at 11:30 p.m., officers said.

Another passenger, John Clark, 21, Rogers, suffered arm cuts in the accident which resulted in a complaint of careless and imprudent driving against the Davenport woman.

LIQUOR SPECIALS THAT PROVE WE APPRECIATE YOUR VISITS

BUY A LOT — AND SAVE A LOT
86-PROOF
OLD CHARTER
KENTUCKY STRAIGHT BOURBON WHISKEY
½ GAL. 1149

10-YR. OLD WISER'S CANADIAN WHISKY NO. 1 SELLER IN CANADA LAST YEAR 519 STH

EXTRA BIG VALUE! CORBY'S RESERVE WHISKEY ONLY 319 5th

IMPORTED HAIG & HAIG 5-STAR SCOTCH 539 5TH

WE GOT MORE GOETZ FOR YOU!
GOETZ 5% BEER 6 PACK 12-OZ. CANS 79¢
PREMIUM QUALITY! ICE COLD

IT'S SIN & TONIC TIME!
QUART-SIZE VALUE
DARBY GIN 90-PROOF 347 QT.

SAVE ON CIGARETTES!
• AT BROWN DERBY #13 REPUBLIC
• AT BROWN DERBY #15 3315 W. SUNSHINE
ALL POPULAR BRANDS
KING & REG. SIZE 299 CTN.
EXTRA LONGS 309 CTN.

Brown Derby
STORES, INC.
600 S. Kimbrough
801 S. Pickwick
301 N. Jefferson
Galloway
1141 S. Glenstone
2037 S. Campbell
1959 S. Glenstone
1601 College
1137 E. Commercial
200 N. Grant
1909 S. Glenstone
701 W. Commercial
1103 W. Kearney
2305 W. Chesterfield Expressway
560 E. Webster
1100 E. Kearney
40 E. Republic
2735 W. Sunshine
2134 E. Sunshine
1301 S. Campbell
723 Boonville
Wine Cellar
1809 S. Glenstone
Eads Food
1915 E. Cherokee

GENERAL TIRE
Smooth Ride SERVICE SPECIAL ...this week only!



FRONT END ALIGNMENT
We correct Caster, Camber, Toe-in, Toe-out to your car manufacturer's specifications ...Safety check and adjust your steering!
ONLY... $9.25 FORD, CHEVY, PLYMOUTH, COMPACTS (Reg. $10.25)
EXTRA CHARGE FOR CARS WITH AIR CONDITIONING AND/OR TORSION BARS

YOUTH CARD: Drivers age 16-21. Ask about our Youth Discount Card

Original Equipment POLYESTER CORD TIRE SALE
GLASS-BELTED
General JUMBO 780
4 for $78.2 FOR $40
LARGER SIZES ALSO AT SALE PRICES!

General JATO SUPER 100 GOLF BALLS
3-BALL PACK ONLY $1.33
Tough, durable cutless cover. Compact 90 compression. High tension winding for maximum flight.
Limit 1 3-ball pack per customer

Charge it at General
GENERAL TIRE SERVICE
"Tires are Our Business"
Official Vehicle Inspection Station
1835 N. Glenstone
"At the Under Pass" 866-4381
OPEN 7:30 to 6 Mon. thru Fri. 7:30 to 3 Saturday

NOW LEASING and DELIVERING 1972 Models
YOUR CHOICE OF LEASE PLAN
ANY MAKE OR MODEL CAR
QUICK - PERSONALIZED SERVICE
Most Competitive LEASING RATES in Town
Southwest Mo. Oldest and Largest Leasing Co.
MARTIN LEASING Inc.
949 ST. LOUIS Phone 862-7426

EARN 7% ON YOUR MONEY
PAYABLE ... MONTHLY, SEMI-ANNUALLY or COMPOUNDED
Please Send Additional Information to
NAME .....
ADDRESS .....
CITY .....
FAMILY LOAN, Inc.
303 ST. LOUIS
R. R. Piland, Pres. Springfield, Mo. 866-7258
MISSOURI RESIDENTS ONLY

Copyright © 2017 Newspapers.com. All Rights Reserved.
Powered by Newspapers.com

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

NOV 0 2 2016

MEMORANDUM

SUBJECT: EPA Region 7 Action Levels for Trichloroethylene in Air

FROM: Mike Beringer, Chief
Environmental Data & Assessment Branch
Environmental Sciences & Technology Division

TO: Branch Chiefs
Waste Enforcement and Materials Management Branch
and Waste Remediation & Permitting Branch
Air and Waste Management Division

Branch Chiefs
Superfund Division

The purpose of this memorandum is to update the U.S. Environmental Protection Agency Region 7 RCRA and Superfund programs on the recommended action levels for trichloroethylene (TCE) in air, and provide information on characterizing and addressing human health risks from less-than-lifetime exposures. The action level for a residential scenario is 2 $\mu g/m^3$, and the action level for an industrial/commercial scenario with an 8-hr workday is 6 $\mu g/m^3$. Equations to allow derivation of action levels for alternative scenarios, such as a 10-hr workday, are presented. As described in this attachment, it is assumed that an exposure to TCE at any time during an approximate three-week period in early pregnancy could result in one or more types of cardiac malformations. Thus, the critical exposure period of concern used to evaluate the potential for heart defects and derive action levels for TCE is one day. An exceedance of the TCE action level indicates a potential imminent threat to human health. Region 7 should expedite early or interim action(s) to eliminate, reduce, and/or control the hazards posed by the site as quickly as possible. If you or your staff have any questions or need further assistance, please contact Kelly Schumacher (x7963).

EPA Region 7 Action Levels for Trichloroethylene in Air.	
Exposure Scenario	*Action Level*
Residential (24 hours/day)	**2 $\mu g/m^3$**
Industrial/Commercial (8 hours/day)[1]	**6 $\mu g/m^3$**

[1] Site-specific action levels should be derived when the workday differs from 8 hours/day.

RECEIVED

NOV 0 3 2016

AWMD/WRAP IO

Attachment

Printed on Recycled Paper

EPA Region 7 Action Levels for Trichloroethylene in Air

Introduction

In 2011, the latest human health toxicity values for trichloroethylene were published by the United States Environmental Protection Agency's Integrated Risk Information System program (EPA, 2011a). As discussed in this document, these new values are partly based on developmental health effects that result from less-than-lifetime exposures. In contrast, the toxicity values typically used to evaluate potential health risks and derive action levels at Superfund and RCRA sites are based on health effects associated with long-term, or chronic exposures. Further, the equations and exposure parameters used typically reflect all or a significant portion of a person's lifetime. Once the current TCE values were released, the protectiveness of using traditional approaches to assess and address TCE exposures was questioned. The purpose of this memorandum is to update the EPA Region 7 RCRA and Superfund programs on the recommended action levels for TCE in air and provide information on characterizing and addressing human health risks from less-than-lifetime exposures. To support these objectives, the window of susceptibility for the developmental toxicity associated with TCE is examined, the critical exposure period of concern is identified, and the appropriate exposure parameters and equations are elucidated.

Toxicity Assessment

The EPA's final toxicological review by the IRIS program incorporates comments by the U.S. National Academy of Sciences (National Research Council, 2006), two U.S. EPA Science Advisory Boards (EPA, 2002 and 2011b), the Executive Office of the President (Office of Management and Budget, 2009 and 2011), the U.S. Department of Defense (DOD, 2009a, 2009b and 2011), the National Aeronautics and Space Administration (NASA, 2009 and 2011), internal Agency reviewers, and the public, among others. The Halogenated Solvents Industry Alliance, Inc., which represents the interests of TCE manufacturers and producers, submitted a Request for Correction of the TCE IRIS assessment (HSIA, 2013), which was denied by the EPA's Acting Assistant Administrator (EPA, 2015). The HSIA then submitted a Request for Reconsideration (HSIA, 2015), which was also denied by the EPA (EPA, 2016a). The EPA found the Requests "directly contrary to the SAB's conclusions and recommendations, such that to accept HSIA's RFC/RFR would require EPA to reject SAB's advice" (EPA, 2016a).

The EPA's Office of Land and Emergency Management recognizes an IRIS assessment as the official Agency scientific position regarding the toxicity of a chemical based on the data available at the time of the review (EPA, 2003). As such, IRIS is generally the preferred source of human health toxicity values used to evaluate risks at Superfund and RCRA hazardous waste sites. In accordance with Directive 9285.7-53 (EPA, 2003), the 2011 IRIS TCE toxicity values will be used to evaluate risks and derive action levels by the Region 7 RCRA and Superfund programs until the 2011 values are either revised or rescinded.

Non-Carcinogenic Health Effects

In general, the EPA assumes that a dose or exposure level exists below which adverse non-carcinogenic health effects will not occur (EPA, 1989). Below this threshold, it is believed that exposure to a chemical is tolerated without adverse effects. Adverse health effects occur only when physiologic protective mechanisms are overcome by exposure to doses or concentrations above the threshold. For chronic toxicity values, the first adverse effect (or its known precursor) that occurs to the most sensitive species as the dose rate of an agent increases, regardless of the exposure duration, is designated the

critical endpoint. The dose or exposure at which the critical endpoint is observed is the point of departure. Uncertainty factors, ranging from 1 to 3,000, reflecting limitations of the data used are applied to the point of departure to derive the inhalation reference concentration. The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime (EPA, 1989).

The 2011 Scientific Advisory Board panel recommended that, "The two endpoints for immune effects from Keil *et al.* (2009) and the cardiac malformations from Johnson *et al.* (2003) should be considered the principal studies supporting the RfC" (EPA, 2011b). The panel considered the immune effects and cardiac malformations co-critical endpoints (EPA, 2011b). In accordance with the SAB panel recommendations, the IRIS program based the TCE chronic reference concentration of 2 $\mu g/m^3$ on these two co-critical endpoints, each of which can support the RfC independently: autoimmune disease following chronic exposure in adults (0.00033 ppm, or 1.8 $\mu g/m^3$) and heart defects following exposure during early pregnancy (0.00037 ppm, or 2.0 $\mu g/m^3$). The RfC is also supported by nephrotoxicity (kidney effects) following chronic exposure in adults (0.00056 ppm, or 3.0 $\mu g/m^3$). Following publication of these values, the developmental cardiac effects were further addressed by the IRIS program in "TCE Developmental Cardiac Toxicity Assessment Update" (EPA, 2014a) and by scientists in the EPA's Office of Research and Development in the peer-reviewed literature (Makris *et al.*, 2016).

Chronic exposure to TCE poses a potential human health hazard to the central nervous system, kidneys, liver, immune system, and male reproductive system. As mentioned above, immunotoxicity in adults is considered a co-critical endpoint, at a slightly lower concentration than that associated with cardiac defects. Overall, the IRIS program concluded that "the human and animal studies of TCE and immune-related effects provide strong evidence for a role of TCE in autoimmune disease and in a specific type of generalized hypersensitivity syndrome" (EPA, 2011a). Kidney toxicity was considered a supporting endpoint, with high confidence found in multiple lines of evidence in both human and animal studies.

Short-term exposures to TCE during pregnancy are associated with many forms of developmental toxicity, including spontaneous abortions, decreased growth, developmental neurotoxicity, developmental immunotoxicity, and birth defects. However, the critical developmental endpoint is cardiac malformations. The primary types of heart defects observed with TCE exposures include atrial and ventricular septal defects, which are holes in the wall (septa) between the top two chambers (atria) or bottom two chambers (ventricles) of the heart, and pulmonary and aortic valve stenoses, which are thickened or fused heart valves that do not properly open and/or close and may leak blood. The critical window of susceptibility for these types of defects is an approximate three week period (i.e., valvuloseptal morphogenesis, or the period in which major cardiac morphogenic events such as heart valve formation occur) approximately four to seven weeks after conception, early in the first trimester of human pregnancy (Dhanantwari *et al.*, 2009). The type and severity of the resulting cardiac malformation or malformations depends on the timing and level of exposure to TCE within this approximate three week period. Exposures that clear the body before this period do not impact the heart valves and septa, because they have not yet begun to form. In humans, TCE and most of its metabolites are eliminated within a week of exposure (EPA, 2011a).

Carcinogenic Effects

The EPA evaluates carcinogenicity in two parts (EPA, 2005a). First, the Agency evaluates all available scientific information and assigns a weight-of-evidence classification based on a compound's potential to cause cancer in humans. In the absence of sufficient data regarding the mode of action or if the

weight-of-evidence supports a mutagenic mode of action, the EPA generally assumes that any exposure to a chemical will increase an individual's risk of developing cancer. Under this default approach, there is no threshold below which the probability of developing cancer is zero. Second, a toxicity value is derived to define the quantitative relationship between dose or concentration and carcinogenic response. For inhalation exposures using the default approach, this value is known as the inhalation unit risk. The IUR is a generally plausible upper-bound estimate of the increased probability of developing cancer following a lifetime of exposure. This value is used to estimate the increased risk of developing cancer from inhalation of potentially carcinogenic chemicals.

Following the EPA's Guidelines for Carcinogen Risk Assessment (EPA, 2005a), the IRIS program has evaluated the carcinogenic potential of TCE and has classified it as "carcinogenic to humans" by all routes of exposure. This conclusion is based on convincing evidence of a causal association between TCE exposure in humans and kidney cancer, strong evidence of non-Hodgkin's lymphoma, and more limited evidence of liver and biliary tract cancer. The inhalation unit risk for TCE, based on these combined cancer types, is 4.1E-06 $(\mu g/m^3)^{-1}$. Sufficient evidence supports a mutagenic mode of action for TCE-induced kidney tumors in humans, but modes of actions have not been established for the other TCE-induced cancer types. The portion of the TCE IUR specific for kidney tumors is 1.0E-06 $(\mu g/m^3)^{-1}$, while the IUR for non-Hodgkin's lymphoma plus liver and biliary tract cancers is 3.1E-06 $(\mu g/m^3)^{-1}$.

Risk Characterization

The EPA's RCRA and Superfund programs characterize potential human health risks using standardized equations that combine toxicity values with exposure parameters because risk is a function of both hazard and exposure. Typically, the EPA's standard default exposure parameters for chronic scenarios, published in OSWER Directive 9200.1-120 (EPA, 2014b), are used. However, exposure assessments must take into account the time scale related to the specific biological response (NRC, 1991). This means that exposure parameters selected to evaluate risks and/or develop levels of concern for a given chemical and scenario should correspond as closely as possible with the exposure period used to develop the toxicity value. For example, time-weighted average exposures over a lifetime have little relevance for a developmental toxin if the adverse effects could only occur following exposure during a particular stage of development (EPA, 1992).

Non-Cancer Hazard Quotients for Cardiac Defects

The toxicity values considered protective for a lifetime of exposure to TCE are partly based on non-cancer health effects resulting from less-than-lifetime exposures. As previously stated, one of the two co-critical endpoints that serves as the basis for the TCE RfC is cardiac defects. This effect can only occur when the fetus is exposed during the period of heart development. Therefore, the EPA's standard default exposure parameters for chronic exposures are invalid for estimating hazard quotients representing the potential for cardiac defects associated with TCE exposures and for deriving TCE levels of concern that are protective of developmental endpoints. To select appropriate less-than-lifetime exposure parameters that may be used to characterize these hazards and derive levels of concern, the critical exposure period of concern for TCE-related heart malformations must first be identified.

"[F]or developmental toxic effects, a primary assumption is that a single exposure at a critical time in development may produce an adverse developmental effect, i.e., repeated exposure is not a necessary prerequisite for developmental toxicity to be manifested" (EPA, 1991). The EPA's Risk Assessment Guidance for Superfund Part A (EPA, 1989) directs the use of a day or a single exposure incident to assess the potential risks of adverse developmental effects. Following this guidance, it is assumed that a

single exposure to TCE at any time during the approximate three week period of valvuloseptal morphogenesis could result in one or more of the types of heart malformations described previously. Thus, the critical exposure period of concern used to evaluate the potential for cardiac defects is one day. A 24-hour exposure period has been used by the EPA to evaluate acute hazards associated with TCE in the final, peer-reviewed TSCA Work Plan Chemical Risk Assessment (EPA, 2014c).

The EPA's Risk Assessment Guidance for Superfund Part F, Supplemental Guidance for Inhalation Risk Assessment (EPA, 2009) specifies that the exposure concentration (EC) that should be used to evaluate risks and derive levels of concern for acute endpoints is equivalent to the concentration detected in air (CA), as shown in Equation 1.

$$EC\left(\frac{\mu g}{m^3}\right) = CA\left(\frac{\mu g}{m^3}\right) \quad (1)$$

For a residential scenario, in which exposure to TCE inside a home is assumed to occur throughout the entire exposure period of concern, Equation 1 is appropriate. However, for other types of scenarios (e.g., industrial, commercial, recreational), exposures to TCE only occur for a portion of any given 24-hour period. Moreover, exposures to different concentrations of TCE may occur within a single day at some sites. To account for these multiple exposures, Equation 1 can be modified, resulting in a time-weighted average exposure concentration. The 24-hour TWA exposure concentration can be calculated using Equation 2.

$$EC_{24} = \sum_{i=1}^{n}(CA_i \cdot ET_i)/AT_{24} \quad (2)$$

where: EC_{24} ($\mu g/m^3$) = time-weighted average exposure concentration over 24 hours;
CA_i ($\mu g/m^3$) = TCE concentration in air in microenvironment (ME) i;
ET_i (hours) = exposure time spent in ME i;
AT_{24} (hours) = averaging time for the exposure period of concern (24 hours)

In a residential scenario, there is a single microenvironment, the residence, with an exposure time of 24 hours. Thus, the Residential EC_{24} will equal CA_{res}, as shown in Equation 3. To reduce uncertainty in residential scenarios, CA_{res} should be based on air samples collected for an entire 24-hour exposure period. Generally, stationary 24-hour indoor air sample results are used.

$$Residential\ EC_{24} = \frac{(CA_{res} \cdot 24\ hrs)}{24\ hrs} = CA_{res} \quad (3)$$

In a typical industrial or commercial scenario, there are two microenvironments. One is the workplace, and the other is away from the workplace. The Industrial/Commercial EC_{24} can be calculated using Equation 4, below. Although the standard value for ET_{work} is an 8-hour workday, this variable should reflect site-specific conditions. For example, employees at a given site may work longer shifts, such as 10 or 12 hours, and they may or may not take their lunch breaks on site. CA_{work} should be based on air samples collected for the entire exposure time, ET_{work}, during the portion of the day that workers are present. This is to prevent potential underestimates of TCE concentrations if diurnal variations occur at a site, although such variability does not exist at all sites. Generally, stationary 8-hour or 10-hour indoor air samples are appropriate. ET_{away} should equal the remainder of the 24-hour period spent away from the workplace. CA_{away} is generally assumed to equal zero, unless site-specific data suggest otherwise.

$$Industrial/Commercial\ EC_{24} = \frac{(CA_{work} \cdot ET_{work}) + (CA_{away} \cdot ET_{away})}{24\ hrs} \quad (4)$$

If multiple or variable microenvironments are present at a site, it is possible to use Equation 2 to generate a 24-hour TWA exposure concentration. However, consideration should be given to the use of portable sampling equipment to more accurately measure true exposure concentrations to the receptor(s) of concern over the entire exposure time, as opposed to stationary sampling equipment positioned in multiple areas where exposure occurs.

Non-cancer hazard quotients for heart defects can be derived using Equation 5, where HQ_{24} is the developmental hazard quotient; EC_{24} is the 24-hr time-weighted average exposure concentration calculated using Equations 2, 3, or 4; and the RfC is 2 $\mu g/m^3$. As shown in Equation 5, a hazard quotient is the ratio of the exposure to the non-cancer toxicity value. Thus, an HQ greater than 1 means that the exposure is greater than the RfC and exceeds a level of concern for that particular non-cancer health effect.

$$HQ_{24} = \frac{EC_{24}}{RfC} \tag{5}$$

Equation 5 can be combined with Equation 3 or 4 to calculate the developmental hazard quotients (HQ_{24}) for a residential or industrial/commercial receptor, as follows.

$$Residential\ HQ_{24} = \frac{CA_{res}}{2\ \frac{\mu g}{m^3}} \tag{6}$$

$$Industrial/Commercial\ HQ_{24} = \frac{(CA_{work} \cdot ET_{work}) + (CA_{away} \cdot ET_{away})}{24\ hrs \cdot 2\ \frac{\mu g}{m^3}} \tag{7}$$

Non-Cancer Hazard Quotients for Chronic Health Effects

Autoimmune disease, a co-critical endpoint upon which the TCE RfC is based, and kidney toxicity, the supporting endpoint, are both health effects associated with chronic or long-term exposures. Equation 8 is the standardized equation used to evaluate non-cancer hazard quotients for chronic health effects; the exposure parameters are defined in Table 1. If seasonal or temporal fluctuations in TCE concentrations potentially exist, consideration should be given as to whether sufficient data are available to generate an average concentration for use as the CA term. If the dataset is limited, it may be more health-protective to use the highest concentration detected.

$$HQ_{chronic} = \frac{CA\left(\frac{\mu g}{m^3}\right) \cdot ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years)}{AT_{nc,chronic}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)} \tag{8}$$

The above equation can be presented in terms of residential or industrial/commercial exposure scenarios, as shown below. Note that it is only appropriate to calculate non-cancer hazard quotients for chronic health effects for those receptors with long-term exposures.

$$Residential\ HQ_{chronic} = \frac{CA_{res}\left(\frac{\mu g}{m^3}\right) \cdot ET_{res}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{res}\left(\frac{days}{year}\right) \cdot ED_{child}(years)}{AT_{nc,chronic,child}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)} \tag{9}$$

$$Industrial/Commercial\ HQ_{chronic} = \frac{CA_{work}\left(\frac{\mu g}{m^3}\right) \cdot ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years)}{AT_{nc,chronic,work}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)} \tag{10}$$

Cancer Risks

TCE is classified "carcinogenic to humans," based on kidney cancer, non-Hodgkin's lymphoma, and liver and biliary tract cancer. Equation 11 is the standardized equation used to evaluate excess individual lifetime cancer risks; the exposure parameters are defined in Table 1. If temporal fluctuations in TCE concentrations potentially exist, consideration should be given as to whether sufficient data are available to generate an average concentration for use as the CA term. If the dataset is limited, it may be more health-protective to use the highest concentration detected.

$$CR = \frac{CA\left(\frac{\mu g}{m^3}\right) \cdot ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}}{AT_{cancer}(days)} \quad (11)$$

The above equation can be presented in terms of residential or industrial/commercial exposure scenarios, as shown below. Because a mutagenic mode of action has been established for kidney tumors associated with TCE, it is necessary to apply age-dependent adjustment factors when deriving risks for this cancer type in children (EPA, 2005b). ADAFs are not applied when deriving risks for non-Hodgkin's lymphoma or liver and biliary tract cancers associated with TCE exposures because they have not been determined to operate via a mutagenic mode of action. Because only adults are evaluated in an industrial/commercial exposure scenario and no adjustments for mutagenicity are made for adults (i.e., $ADAF_{adult} = 1$), ADAFs are not included in Equation 13.

$$Residential\ CR = \left(\frac{CA_{res}\left(\frac{\mu g}{m^3}\right) \cdot ET_{res}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{res}\left(\frac{days}{year}\right)}{AT_{cancer}(days)}\right) \cdot \left[\left(ED_{0-2}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{0-2}\right) + \left(ED_{2-16}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{2-16}\right) + \left(ED_{16-26}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{adult}\right) + \left(ED_{res}(years) \cdot IUR_{N\&L}\left(\frac{\mu g}{m^3}\right)^{-1}\right)\right] \quad (12)$$

$$Industrial/Commercial\ CR = \frac{CA_{work}\left(\frac{\mu g}{m^3}\right) \cdot ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}}{AT_{cancer}(days)} \quad (13)$$

The definitions, values, and references for the exposure parameters and toxicity values used in this document are provided in Table 1. For the chronic scenarios, the EPA's standard default exposure parameters (EPA, 2014b) are used to best represent reasonable maximum exposure scenarios, which are the highest exposures reasonably expected to occur at a site (EPA, 1989). These values are based on the 2011 Exposure Factors Handbook (EPA, 2011c). Although the default exposure time for an indoor worker is 8 hours/day, it is preferable to identify a site-specific worker exposure time.

Table 1. Exposure Parameters and Toxicity Values.

Parameter	Definition	Units	Value	Reference
$ADAF_{0-2}$	Age-dependent adjustment factor – ages 0 to 2 years	-	10	EPA, 2005b
$ADAF_{2-16}$	Age-dependent adjustment factor – ages 2 to 16 years	-	3	EPA, 2005b
$ADAF_{adult}$	Age-dependent adjustment factor – ages 16 years and older	-	1	EPA, 2005b
AT_{24}	Averaging time – developmental effects	hours	24	-
AT_{cancer}	Averaging time – cancer	days	25,550	EPA, 2014b

Table 1. Exposure Parameters and Toxicity Values.				
Parameter	**Definition**	**Units**	**Value**	**Reference**
$AT_{nc,chronic,\ child}$	Averaging time – chronic non-cancer health effects, resident child	days	2,190	EPA, 2014b
$AT_{nc,chronic,\ work}$	Averaging time – chronic non-cancer health effects, indoor worker	days	9,125	EPA, 2014b
CA	Concentration of TCE in air	$\mu g/m^3$	Measured	-
CA_{res}	Concentration of TCE in air of the residence	$\mu g/m^3$	Measured	-
CA_{work}	Concentration of TCE in air of the workplace	$\mu g/m^3$	Measured	-
$ED_{0\text{-}2}$	Exposure duration – ages 0 to 2 years	years	2	EPA, 2005b
$ED_{2\text{-}16}$	Exposure duration – ages 2 to 16 years	years	14	EPA, 2005b
$ED_{16\text{-}26}$	Exposure duration – ages 16 to 26 years	years	10	EPA, 2005b
ED_{child}	Exposure duration – resident (child, ages 0 to 6 years)	years	6	EPA, 2014b
ED_{res}	Exposure duration – resident (child + adult, ages 0 to 26 years)	years	26	EPA, 2014b
ED_{work}	Exposure duration – indoor worker	years	25	EPA, 2014b
EF_{res}	Exposure frequency – resident	days/yr	350	EPA, 2014b
EF_{work}	Exposure frequency – indoor worker	days/yr	250	EPA, 2014b
ET_{away}	Exposure time – time spent away from work by an indoor worker (24 hrs/day minus ET_{work})	hrs/day	16 or site-specific	-
ET_{res}	Exposure time – time spent at home by a resident	hrs/day	24	EPA, 2014b
ET_{work}	Exposure time – time spent at work by an indoor worker	hrs/day	8 or site-specific	EPA, 2014b or site-specific
IUR	TCE inhalation unit risk - total	$(\mu g/m^3)^{-1}$	4.1E-06	EPA, 2011a
IUR_{kid}	TCE inhalation unit risk – kidney cancer	$(\mu g/m^3)^{-1}$	1.0E-06	EPA, 2011a
$IUR_{N\&L}$	TCE inhalation unit risk – non-Hodgkin's lymphoma and liver and biliary tract cancers	$(\mu g/m^3)^{-1}$	3.1E-06	EPA, 2011a
RfC	TCE reference concentration	$\mu g/m^3$	2	EPA, 2011a
THQ	Target hazard quotient	-	1	-
TR	Target cancer risk	-	1E-04	Upper-end of Target Cancer Risk Range

Action Levels

Level of Concern for Developmental Effects

Equations 2 and 5 can be manipulated to solve for the level of concern for developmental health effects, using a target non-cancer hazard quotient of 1, as follows. Note that the only exposure parameter that can vary in this calculation is the exposure time. The TCE levels of concern for developmental effects based on standard exposure times are provided in Table 2. For a 24-hour residential scenario, the developmental LOC equals 2 $\mu g/m^3$. For a typical 8-hour industrial/commercial scenario, the developmental LOC equals 6 $\mu g/m^3$. Site-specific developmental LOCs may be derived using alternate exposure times; for example, a 10-hour exposure time results in a developmental LOC of 4.8 $\mu g/m^3$.

$$TCE\ LOC_{developmental}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{24}(hrs) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET\left(\frac{hrs}{day}\right)} \quad (14)$$

$$TCE\ Residential\ LOC_{developmental}\left(\frac{\mu g}{m^3}\right) = \frac{1 \cdot 24\ hrs \cdot 2\ \frac{\mu g}{m^3}}{24\ hrs} \quad (15)$$

$$TCE\ Industrial/Commercial\ LOC_{developmental}\left(\frac{\mu g}{m^3}\right) = \frac{1 \cdot 24\ hrs \cdot 2\ \frac{\mu g}{m^3}}{ET_{work}\left(\frac{hrs}{day}\right)} \quad (16)$$

Level of Concern for Chronic Non-Cancer Health Effects

Equation 8 can be manipulated to solve for the level of concern for chronic, non-cancer health effects, using a target non-cancer hazard quotient of 1 and the exposure parameters presented in Table 1, as follows. For a residential scenario, this LOC equals 2.1 μg/m^3, which is the value listed as the non-cancer residential air Regional Screening Level for TCE, based on an HQ of 1 (EPA, 2016b). For an industrial/commercial scenario, the chronic LOC equals 8.8 μg/m^3, which is the value listed as the non-cancer worker air RSL for TCE, based on an HQ of 1. Site-specific chronic LOCs may be derived using alternate exposure times or other parameters.

$$TCE\ LOC_{chronic}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{nc,chronic}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years)} \quad (17)$$

$$TCE\ Residential\ LOC_{chronic}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{nc,chronic,child}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET_{res}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{res}\left(\frac{days}{year}\right) \cdot ED_{child}(years)} \quad (18)$$

$$TCE\ Industrial/Commercial\ LOC_{chronic}\left(\frac{\mu g}{m^3}\right) = \frac{THQ \cdot AT_{nc,chronic,work}(days) \cdot RfC\left(\frac{\mu g}{m^3}\right)}{ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years)} \quad (19)$$

Level of Concern for Cancer Risks

Equations 11, 12, and 13 can be manipulated to solve for the level of concern for cancer risks, using a target excess cancer risk (TR) of 1E-04, which is the upper bound of the EPA's target cancer risk range, and the exposure parameters presented in Table 1, as follows. For a residential scenario, this LOC equals 48 μg/m^3, and for an industrial/commercial scenario, the cancer LOC equals 300 μg/m^3.

$$TCE\ LOC_{cancer}\left(\frac{\mu g}{m^3}\right) = \frac{TR \cdot AT_{cancer}(days)}{ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot ED(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}} \quad (20)$$

$$TCE\ Residential\ LOC_{cancer}\left(\frac{\mu g}{m^3}\right) = \frac{TR \cdot AT_{cancer}(days)}{ET\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF\left(\frac{days}{year}\right) \cdot \left[\begin{array}{c}\left(ED_{0-2}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{0-2}\right) + \left(ED_{2-16}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{2-16}\right) + \\ \left(ED_{16-26}(years) \cdot IUR_{kid}\left(\frac{\mu g}{m^3}\right)^{-1} \cdot ADAF_{16-26}\right) + \left(ED_{res}(years) \cdot IUR_{N\&L}\left(\frac{\mu g}{m^3}\right)^{-1}\right)\end{array}\right]} \quad (21)$$

$$TCE\ Industrial/Comm.\ LOC_{cancer}\left(\frac{\mu g}{m^3}\right) = \frac{TR \cdot AT_{cancer}(days)}{ET_{work}\left(\frac{hrs}{day}\right) \cdot \left(\frac{1\ day}{24\ hrs}\right) \cdot EF_{work}\left(\frac{days}{year}\right) \cdot ED_{work}(years) \cdot IUR\left(\frac{\mu g}{m^3}\right)^{-1}} \quad (22)$$

As shown below in Table 2, the levels of concern for developmental health effects are lower than the LOCs for chronic health effects and cancer, for both residential and occupational scenarios, when based on target hazard quotients of 1 or target cancer risks of 1E-04. These are the levels of risk that, when exceeded, warrant action under the National Contingency Plan. Basing the Region 7 TCE action levels

on the developmental LOCs is protective for all potential forms of adverse health effects associated with TCE. Thus, the action level for a residential scenario is 2 $\mu g/m^3$, and the action level for a typical industrial/commercial scenario with an 8-hr workday is 6 $\mu g/m^3$. As previously mentioned, the developmental LOC, and thus the action level, is highly dependent on the exposure time. Therefore, for non-residential exposure scenarios, careful consideration should be given to the value selected as the exposure time.

Table 2. Levels of Health Concern for Trichloroethylene ($\mu g/m^3$), THQ = 1 and TR = 1E-04.	
Residents (24-hr Exposure Scenario)	
Developmental Non-Cancer LOC:	*2*
Chronic Non-Cancer LOC:	*2.1*
Cancer LOC:	*48*
Region 7 Residential TCE Action Level:	**2**
Industrial/Commercial Workers (8-hr Exposure Scenario)	
Developmental Non-Cancer LOC:	*6*
Chronic Non-Cancer LOC:	*8.8*
Cancer LOC:	*300*
Region 7 Industrial/Commercial TCE Action Level:	**6**

Risk Management Considerations

If the TCE action level is exceeded, this indicates a potential imminent threat to human health, and early or interim action(s) should be taken to eliminate, reduce, and/or control the hazards posed by the site (EPA, 2014d). At Superfund sites, coordination between the remedial and removal programs should immediately commence as early as the receipt of preliminary sampling results indicative of a potential human health concern (EPA, 2016c). Potential receptors should be informed of the results and potential risks to human health. Standard Region 7 practice is to communicate this information via data transmittal letters submitted to property owners and employers, but when TCE action levels are exceeded, tenants, residents, employees and others who may be exposed should also be informed. Although the action levels derived in this document are applicable to women in the first trimester of pregnancy, note that the levels protective of autoimmune disease and kidney toxicity in all individuals are not significantly different, at 2.1 and 8.8 $\mu g/m^3$, for residents and workers, respectively. Depending on the concentrations detected, immediate site actions could include relocation, restricting the time residents or workers remain in areas exceeding action levels, opening basement or lower level windows for ventilation (using a fan), sealing cracks in the slab, sealing sump pits, sealing cinder block or stone walls, and/or using air filtration systems. Vapor mitigation systems or adjustments to HVAC systems may be used to minimize exposures on a more long-term basis. Post-remedy testing and continued operation and maintenance is necessary to ensure protection of human health until the source of TCE in soil and/or groundwater is ultimately addressed.

Other EPA Regions and states have derived tiered action levels prescribing the types and urgency of various responses, as described below.

- Although Region 7 consistently uses a THQ of 1 as the basis for both removal and remedial Superfund actions, other Regions have used a THQ of 3 as a science policy approach to prioritize actions that may warrant the use of removal authority, with ultimate cleanup goals based on a THQ of 1. Since non-cancer toxicity values have historically been based on effects resulting from chronic exposure, this practice assumes that the most highly contaminated sites will be remediated first, but all sites will be remediated before exposures have occurred for a sufficiently long duration (e.g., 25 years as a worker or 26 years as a resident) to pose significant health risks.

This assumption is not protective of the short-term health effects associated with TCE, in which the critical window of susceptibility is an approximate three week period and a single exposure during this critical time may result in cardiac malformations.

- Tiered action levels could also be derived by reducing the uncertainty factor applied to the RfC from 10 to 1. The existing UF of 10 is applied for uncertainty regarding differences in pharmacodynamics between animals and humans and between the general population and sensitive subpopulation. Other than the toxicokinetic variability characterized by the physiologically-based pharmacokinetic model, EPA (2011a) indicates that there are inadequate chemical-specific data to quantify the degree of differential susceptibility due to factors such as genetic polymorphisms, race/ethnicity, preexisting health status, lifestyle factors, and nutritional status. The UF of 10 was included in the extensive peer-review process described in this document, and Region 7 does not have justification to alter this value.
- Similarly, the selection of a 1% excess risk as the benchmark response and a human equivalent concentration for a toxicokinetically sensitive individual at the 99th percentile were both extensively reviewed, and Region 7 does not have justification to alter these criteria.

Although Region 7 has not developed tiered levels because this approach may not be protective of human health, higher concentrations of TCE are associated with greater health risks. Actions should be implemented as quickly as is practicable to minimize risks of developmental toxicity. This document reinforces that Region 7 should expedite actions to protect human health whenever the TCE air concentration exceeds 2 $\mu g/m^3$ in a residential scenario or 6 $\mu g/m^3$ for an 8-hour worker scenario.

REFERENCES

Dhanantwari, P; Lee, E; Krishnan, A; Samtani, R; Yamada, S; Anderson, S; Locket, E; Donofrio, M; Shiota, K; Leatherbury, L; Lo, CW. 2009. Human cardiac development in the first trimester: a high-resolution magnetic resonance imaging and episcopic fluorescence image capture atlas. *Circulation* 120: 343–51.

Halogenated Solvents Industry Alliance, Inc. 2013. Request for Correction – IRIS Assessment for Trichloroethylene. RFC 14001. November 5, 2013.

Halogenated Solvents Industry Alliance, Inc. 2015. Request for Reconsideration/#14001. RFR 14001A. June 17, 2015.

Johnson, P.; Goldberg, S.; Mays, M.; Dawson, B. 2003. Threshold of trichloroethylene contamination in maternal drinking waters affecting fetal heart development in the rat. *Environ Health Perspect.* 111: 289-292. http://www.ncbi.nlm.nih.gov/pubmed/12611656

Keil, D; Peden-Adams, M; Wallace, S; Ruiz, P; Gilkeson, G. 2009. Assessment of trichloroethylene (TCE) exposure in murine strains genetically-prone and non-prone to develop autoimmune disease. *J Environ Sci Health A Tox Hazard Subst Environ E*ng. 44: 443-453. http://dx.doi.org/10.1080/10934520902719738

Makris, SL; Scott, CS; Fox, J; Knudsen, TB; Hotchkiss, AK; Arzuaga, X; Euling, SY; Powers, CM; Jinot, J; Hogan, KA; Abbott, BD; Hunter III, ES; Narotsky, MG. 2016. A systematic evaluation of the potential effects of trichloroethylene exposure on cardiac development. *Reprod Toxicol.* 65(2016): 321-358.

National Aeronautics and Space Administration. 2009. NASA Review/Comments on Draft EPA TCE IRIS Risk Assessment. August 26, 2009. http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=492690

National Aeronautics and Space Administration. 2011. NASA Comments on the Final Draft TCE IRIS Risk Assessment. July 2011. http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=503452

National Research Council. 1991. Human Exposure Assessment for Airborne Pollutants: Advances and Opportunities. Washington, DC: The National Academy Press, 1991.

National Research Council. 2006. Assessing the Human Health Risks of Trichloroethylene: Key Scientific Issues. Washington, DC: The National Academies Press, 2006.

Office of Management and Budget. 2009. OMB Staff Comments on EPA IRIS draft TCE Toxicological Review and Draft Charge (drafts dated June 2009). September, 1, 2009. http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=492688

Office of Management and Budget. 2011. OMB Staff Working Comments on EPA's Final Agency/Interagency Science Discussion draft Toxicological Review of Trichloroethylene (TCE) and draft IRIS Summary (dated June 2011). July 21, 2011. http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=503454

U.S. Department of Defense. 2009a. Department of Defense Comments on the Draft TCE Toxicological Review; Peer Review Charge, June 2009. The Chemical Material Risk Management Directorate. August 27, 2009. http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=492692

U.S. Department of Defense. 2009b. Department of Defense Comments on the IAR Draft USEPA TCE Risk Assessment, June 2009. The Chemical Material Risk Management Directorate. September 1, 2009. http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=492691

U.S. Department of Defense. 2011. Department of Defense Comments on TCE IASD final draft Tox Review redline.pdf. The Chemical Material Risk Management Directorate. July 15, 2011. http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=503451

U.S. Environmental Protection Agency. 1989. Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual - Part A. EPA/540/1-89/002. Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency. 1991. Guidelines for Developmental Toxicity Risk Assessment. EPA/600/FR-91/001. Risk Assessment Forum, Washington, D.C.

U.S. Environmental Protection Agency. 1992. Guidelines for Exposure Assessment. EPA/600/Z-92/001. Risk Assessment Forum, Washington, D.C.

U.S. Environmental Protection Agency. 2002. Review of Draft Trichloroethylene Health Risk Assessment: Synthesis and Characterization: An EPA Science Advisory Board Report. EPA-SAB-EHC-03-002. TCE Review Panel, Environmental Health Committee, US EPA Science Advisory Board. Washington, D.C. December 2002. http://yosemite.epa.gov/sab%5Csabproduct.nsf/D14C306CF5482E41852571CE00697543/$File/ehc03002.pdf

U.S. Environmental Protection Agency. 2003. Human Health Toxicity Values in Superfund Risk Assessments. OSWER Directive 9285.7-53. Office of Superfund Remediation and Technology Innovation, Washington, D.C.

U.S. Environmental Protection Agency. 2005a. Guidelines for Carcinogen Risk Assessment. EPA/630/P-03/001F. Risk Assessment Forum, Washington, D.C.

U.S. Environmental Protection Agency. 2005b. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. EPA/630/R-03/003F. Risk Assessment Forum, Washington, D.C.

U.S. Environmental Protection Agency. 2009. Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment). OSWER Publication 9285.7-82. Office of Superfund Remediation and Technology Innovation, Washington, D.C.

U.S. Environmental Protection Agency. 2011a. Toxicological Review of Trichloroethylene (CAS No. 79-01-6). EPA/635/R-09/011F. Washington, D.C. September 2011.

U.S. Environmental Protection Agency. 2011b. Review of EPA's Draft Assessment entitled 'Toxicological Review of Trichloroethylene' (October 2009). EPA-SAB-11-002. TCE Review Panel, US EPA Science Advisory Board. Washington, D.C. January 11, 2011. http://yosemite.epa.gov/sab%5Csabproduct.nsf/B73D5D39A8F184BD85257817004A1988/$File/EPA-SAB-11-002-unsigned.pdf

U.S. Environmental Protection Agency. 2011c. Exposure Factors Handbook: 2011 edition. National Center for Environmental Assessment, Washington, DC; EPA/600/R-09/052F.

U.S. Environmental Protection Agency. 2014a. TCE Developmental Cardiac Toxicity Assessment Update. EPA-HQ-OPPT-2012-0723-0045. July 2014. http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2012-0723-0045

U.S. Environmental Protection Agency. 2014b. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response, Washington, D.C.

U.S. Environmental Protection Agency. 2014c. TSCA Work Plan Chemical Risk Assessment. Trichloroethylene: Degreasing, Spot Cleaning and Arts & Crafts Uses. CASRN: 79-01-6. EPA Document 740-R1-4002. Office of Chemical Safety and Pollution Prevention, Washington, D.C. June 2014

U.S. Environmental Protection Agency. 2014d. Compilation of Information Relating to Early/Interim Actions at Superfund Sites and the TCE IRIS Assessment. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response, Washington, D.C. August 27, 2014.

U.S. Environmental Protection Agency. 2015. EPA Response to RFC 14001. March 19, 2015.

U.S. Environmental Protection Agency. 2016a. EPA Response to RFR 14001A. February 26, 2016.

U.S. Environmental Protection Agency. 2016b. Regional Screening Levels for Chemical Contaminants at Superfund Sites. Accessed September 22, 2016. https://www.epa.gov/risk/regional-screening-levels-rsls

U.S. Environmental Protection Agency. 2016c. Remedial and Removal Program Coordination Regarding Potential Imminent Threats to Human Health or the Environment. Office of Land and Emergency Management, Washington, D.C. August 11, 2016.